THE UNIVERSITY of EDINBURGH

Edinburgh Research Explorer

Chemical Injury Surveillance for New Zealand, 2007

Citation for published version:
Tisch, C & Slaney, D 2008, *Chemical Injury Surveillance for New Zealand, 2007: Annual Report 2008 for Ministry of Health, Wellington*. Client Report, no. FW0859, Chemical Injury Surveillance System (CISS). <https://surv.esr.cri.nz/surveillance/chemical_injuries.php?we_objectID=1617>

Link:
Link to publication record in Edinburgh Research Explorer

Document Version:
Publisher's PDF, also known as Version of record

General rights
Copyright for the publications made accessible via the Edinburgh Research Explorer is retained by the author(s) and / or other copyright owners and it is a condition of accessing these publications that users recognise and abide by the legal requirements associated with these rights.

Take down policy
The University of Edinburgh has made every reasonable effort to ensure that Edinburgh Research Explorer content complies with UK legislation. If you believe that the public display of this file breaches copyright please contact openaccess@ed.ac.uk providing details, and we will remove access to the work immediately and investigate your claim.

Download date: 07. May. 2023

Chemical Injury Surveillance for New Zealand, 2007

Prepared for the New Zealand Ministry of Health

June 2008

Catherine Tisch
David Slaney

Client Report
FW0859

Chemical Injury Surveillance for New Zealand, 2007

Bruce Adlam
Programme Leader, Population & Environmental Health

Catherine Tisch
Project Leader

Tammy Hambling
Peer Reviewer

DISCLAIMER

This report or document ("the Report") is given by the Institute of Environmental Science and Research Limited ("ESR") solely for the benefit of the Ministry of Health, Public Health Service Providers and other Third Party Beneficiaries as defined in the Contract between ESR and the Ministry of Health, and is strictly subject to the conditions laid out in that Contract.

Neither ESR nor any of its employees makes any warranty, express or implied, or assumes any legal liability or responsibility for use of the Report or its contents by any other person or organisation.

ACKNOWLEDGMENTS

This report could not have been generated without the support of staff from the Coronial Services Office (CSO), New Zealand Health Information Service (NZHIS), the National Poisons Centre (NPC) and the Public Health Units. The authors wish to especially thank Clifford Slade (CSO), Chris Lewis (NZHIS), and Lucy Shieffelbien (NPC) for data downloads, and Venkatesham Varikuppala (Auckland Regional Public Health Service), Justen Smith (Regional Public Health), Christopher Bergin (West Coast Public Health Unit), and Sharron Lane (Southland Public Health Unit) for the hazardous substance injury emergency department data. In addition, the authors would also like to thank the following people who were involved with providing DriftNet data where applicable: Paul Reid (Northland Public Health Unit), Graham Ferguson (Auckland Regional Public Health Service), Glenda Smith (Waikato Public Health Unit), Helen Van der Werf (Tauranga; Toi Te Ora Public Health), Bruce Barnett (Whakatane; Toi Te Ora Public Health), Alan Hall (Tairawhiti District Health), Ross Price (Rotorua; Toi Te Ora Public Health), David de Jager (Taranaki Public Health Unit), Stephanie Shepherd (Taranaki Public Health Unit), Noel Watson (Health Care Hawke's Bay), Margaret Turnbridge (Wanganui Public Health Centre), Peter Wood (MidCentral Health), Rebecca Fox (Wairarapa Public Health Unit), Gail O'Leary (Regional Public Health), David Speedy (Nelson Marlborough Health), Christopher Bergin (West Coast Public Health Unit), Lew Graham (Canterbury; Community and Public Health), Steve Waller (South Canterbury; Community and Public Health), Andrew Shand (Dunedin; Public Health South), and Neil Cavaney (Invercargill; Public Health South). Thank you also to Paul Wing for providing ACC data.

The authors would also like to acknowledge the support and contribution by ESR staff, particularly Carol Kliem and Donald Peterkin for assistance with the data warehouse component of the project, and Tammy Hambling for assistance with collection of the CSO data and for peer review. In addition, we would like to thank Naty Foronda and Sally Gilbert from the Ministry of Health for their input during the course of this project.

CONTENTS

LIST OF FIGURES

LIST OF TABLES

EXECUTIVE SUMMARY

Current Situation

- The Chemical Injury Surveillance System (CISS) presently incorporates national mortality data [sourced from the Coronial Services Office (CSO)], national inpatient hospitalisation data [sourced from the New Zealand Health Information Service (NZHIS)], national human exposure poisoning phone call data [sourced from the National Poisons Centre (NPC)], national spraydrift data (sourced from the DriftNet surveillance system), national chemical/poison related notifiable diseases data [sourced from EpiSurv, the National Notifiable Disease Database] and national accident claim data [sourced from the Accident Compensation Corporation (ACC)].
- CISS also incorporates local emergency department data notified to Public Health Units (PHUs). Data received from PHUs for 2007 represent the following District Health Boards (DHBs): Auckland, Capital and Coast, West Coast and Southland.
- In December 2005, an amendment to the Hazardous Substances and New Organisms (HSNO) Act was made that now requires all diagnosing medical practitioners in addition to hospital practitioners to report injuries caused by hazardous substances to the Medical Officer of Health. A case report form in EpiSurv to capture this data became operational on 19 September 2007.

Results

- *National results for 2007:*
    - 80 chemical injury deaths reported from CSO as of 31 December 2007, a national rate of 2.0 per 100 000 population. Data estimated to be 50-60% complete (varies by DHB) due to time lags associated with this data.
    - 8606 poisoning hospitalisations (NZHIS), a national rate of 213.6 per 100 000 population.
    - 21 805 NPC calls categorised as human poisonings.
    - 8 spraydrift complaints.
    - 13 chemical poisoning from the environment notifications, no notifications of decompression sickness, 78 lead absorption notifications, 3 notifications of toxic shellfish poisoning and 3 notifications of hazardous substances injury.
    - Approximately 558 claims to ACC relating to chemical and hazardous substances injury.
    - A HSNO substance was the primary substance involved in 35 deaths involving 5 substances, 158 PHU notifications involving 46 substances and 3 Hazardous Substances Injury notifications via EpiSurv involving 5 substances.

- *Auckland DHB results for 2007:*
    - 7 chemical injury deaths reported from CSO, a rate of 1.7 per 100 000 population.
    - 936 poisoning hospitalisations (NZHIS), a rate of 231.3 per 100 000 population.
    - 2624 Auckland City Hospital injury notifications, a rate of 648.5 per 100 000 population.

- *Capital and Coast DHB results for 2007:*
  - 8 chemical injury deaths reported from CSO, a rate of 3.0 per 100 000 population.
  - 275 poisoning hospitalisations (NZHIS), a rate of 103.1 per 100 000 population.
  - 576 Wellington/Kenepuru Hospital injury notifications, a rate of 216.0 per 100 000 population.

- *West Coast DHB results for 2007:*
  - No chemical injury deaths reported from CSO.
  - 87 poisoning hospitalisations (NZHIS), a rate of 277.6 per 100 000 population.
  - 15 Grey Hospital injury notifications, a rate of 47.9 per 100 000 population.

- *Southland DHB results for 2007:*
  - 2 chemical injury deaths reported from CSO, a rate of 1.9 per 100 000 population.
  - 255 poisoning hospitalisations (NZHIS), a rate of 238.7 per 100 000 population.
  - 118 Invercargill Hospital injury notifications, a rate of 110.5 per 100 000 population.

- *Mortality data for 2004/2005*
  - 227 chemical injury deaths in 2005 and 177 in 2006, as of 31 December 2007 (estimated to be 90% complete). Corresponding annual rates of 5.6 and 4.4 per 100 000 population, respectively.
  - Demographic and substance trends were similar for both years.

1. INTRODUCTION

In 2001, the Institute of Environmental Science and Research (ESR) was commissioned by the New Zealand Ministry of Health (MoH) to develop a national Chemical Injury Surveillance System (CISS). The CISS was primarily developed in response to the legislative requirements of Section 143 of the Hazardous Substances and New Organisms (HSNO) Act (1996); all hazardous substance injuries that result in hospitalisation are to be notified to the Medical Officer of Health. In December 2005, the HSNO Act was amended to include hazardous substance injury notifications from diagnosing medical practitioners.

The CISS is intended to encompass this requirement, and extend it to achieve the greatest public health utility. Hazardous substances incorporated in the CISS include substances not covered by the HSNO Act such as medicines in finished dose form, and party drugs or alcohol when classified as food (see also p.2). Reporting to the CISS is not a legislative requirement, but it is one mechanism through which hospital and medical practitioners can meet their statutory obligations under the HSNO Act. The following describes the objectives and scope of the CISS (adapted from previous ESR reports to the MoH (Bates & Fowles, 2000; Fowles, 2001)), provides some definitions and discusses the current situation and other previously trialled approaches.

1.1. Objectives of the CISS

Two primary objectives are outlined below for the CISS:

- National surveillance of chemical/hazardous substance injuries resulting in the review of appropriate controls for certain products, and areas for targeted intervention, including: restriction of access to methods of (para) suicide, reducing the number of childhood poisonings through reviewing child resistant packaging needs for certain products, and improving workplace practices leading to a reduced number of serious acute injuries from occupational settings
- Improved local surveillance of chemical/hazardous substance injuries, by collecting specific data on substance/product, circumstances, and specific susceptible groups. The result being, the prioritisation of resources for facilitating investigations, intervention priorities and enforcement activities.

1.2. Scope of the CISS

1.2.1. Inclusions

The system is intended to cover:

- Injuries (for example, poisonings and chemical burns) caused by inappropriate use of hazardous substances including flammables and explosives
- Injuries caused by inappropriate use of therapeutic substances and alcohol (when classified as food)
- Poison/chemical related hospital admissions (including short stay unit admissions and presentations to emergency departments)

- Injuries from hazardous substances (under the HSNO Act) that result in a presentation to a medical practitioner (captured in EpiSurv as of 19 September 2007)
- Fatalities where the primary cause of death was poison/chemical related
- Both intentional and unintentional exposures
- Chemical/poison related notifiable disease (non-biological).

1.2.2. Exclusions

The system is **not** intended to cover:

- Adverse reactions to therapeutic agents when used as intended
- Injuries or deaths where poisoning is a secondary cause (for example, car crashes)
- Biological food poisonings (for example, salmonellosis).

1.3. Definitions

"**Hospitalisation**": The MoH has interpreted "hospitalisations" to include all hospital attendances, irrespective of whether the patient is classed as an inpatient or outpatient. The MoH considers the distinction between overnight stays and brief stays to be irrelevant, but considers that the important element is whether the person was treated as a patient.

"**Hazardous substance**": The HSNO Act defines a hazardous substance as a substance which possesses an intrinsic toxicity, ecotoxicity, flammability, capacity to oxidise, explosive, or corrosive property that meet pre-defined thresholds set by the Environmental Risk Management Authority New Zealand (ERMA) (Environmental Risk Management Authority New Zealand, 2008). Certain substances are excluded from ERMA's jurisdiction even though they are clearly hazardous under the definition of the Act - this is because they are regulated under different legislation. Examples of these substances include human therapeutic drugs in finished form (which are regulated under the Medicines Act) and alcohol when classified as a food (which is regulated under the Food Act). These substances are often referred to as 'non-hazardous, for the purposes of the HSNO Act'. Since the CISS is an instrument of the MoH, and is driven by a public health need, the substances included in it extend beyond that defined by ERMA's regulatory limits. This is why therapeutic drugs and alcohol are included in the system, even though they are not regulated by ERMA per se.

"**Injury**": Has been defined by the MoH as any physical harm or damage serious enough to warrant medical treatment.

Substance Classes, for example chemicals/drugs of abuse: refer to Appendix 2.

1.4. Current Situation

Figure 1 presents a summary of the evolution of the New Zealand Chemical Injury Surveillance System.

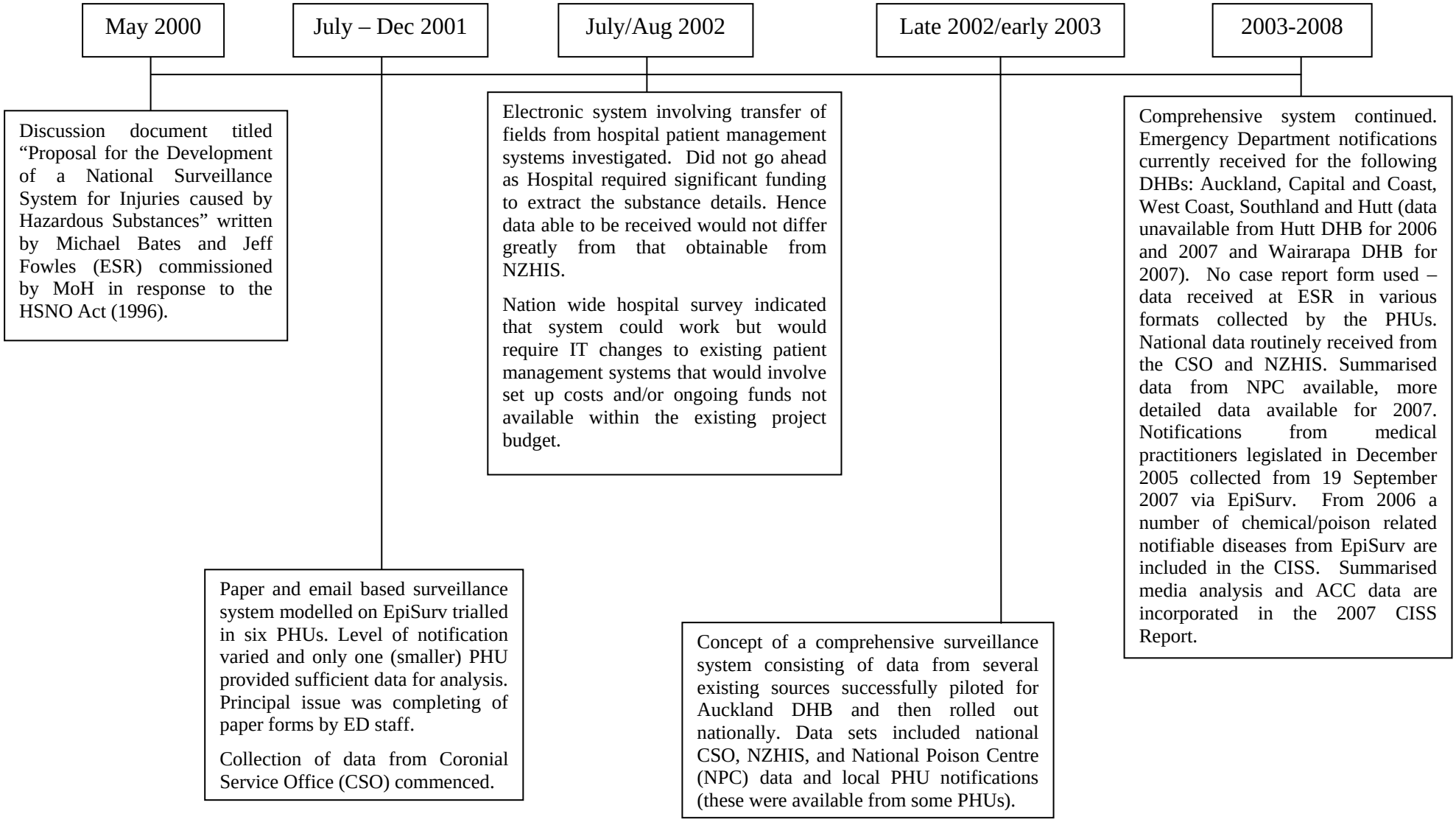

Figure 1: Evolution of CISS

Since 2001, three approaches for obtaining hospital notification data have been trialled and/or assessed. The latest, successfully trialled for Auckland in 2003 was a 'comprehensive' surveillance system incorporating injury data from the NZHIS, NPC, CSO and PHU. Results of this trial were presented in a report to the MoH in December 2003 (McDowell *et al.*, 2003).

Despite encountering some issues, the trial was able to provide better functional analyses for local investigation and intervention, as well as national policy and practice, than other systems trialled to date. Specifically, the information provided by each data set could be used to better understand the underlying causes and consequences of exposures to hazardous substances.

Figure 2 is known as the injury pyramid; it demonstrates the relationship between severity of injury and the number of injuries that occur. For example, the peak of the injury pyramid represents fatal injuries, these are fewer in number but are highly visible, conversely, the base of the pyramid depicts injuries that do not receive attention in a health care institution; this represents the greatest number of injuries. The CSO mortality data, NZHIS inpatient hospitalisation data, PHU hospital emergency department data, NPC data, DriftNet spraydrift complaint data, EpiSurv chemical/poison related notifiable disease data and medical practitioner HSNO notifications, and ACC claim data, therefore cover a wide spectrum of the injury pyramid.

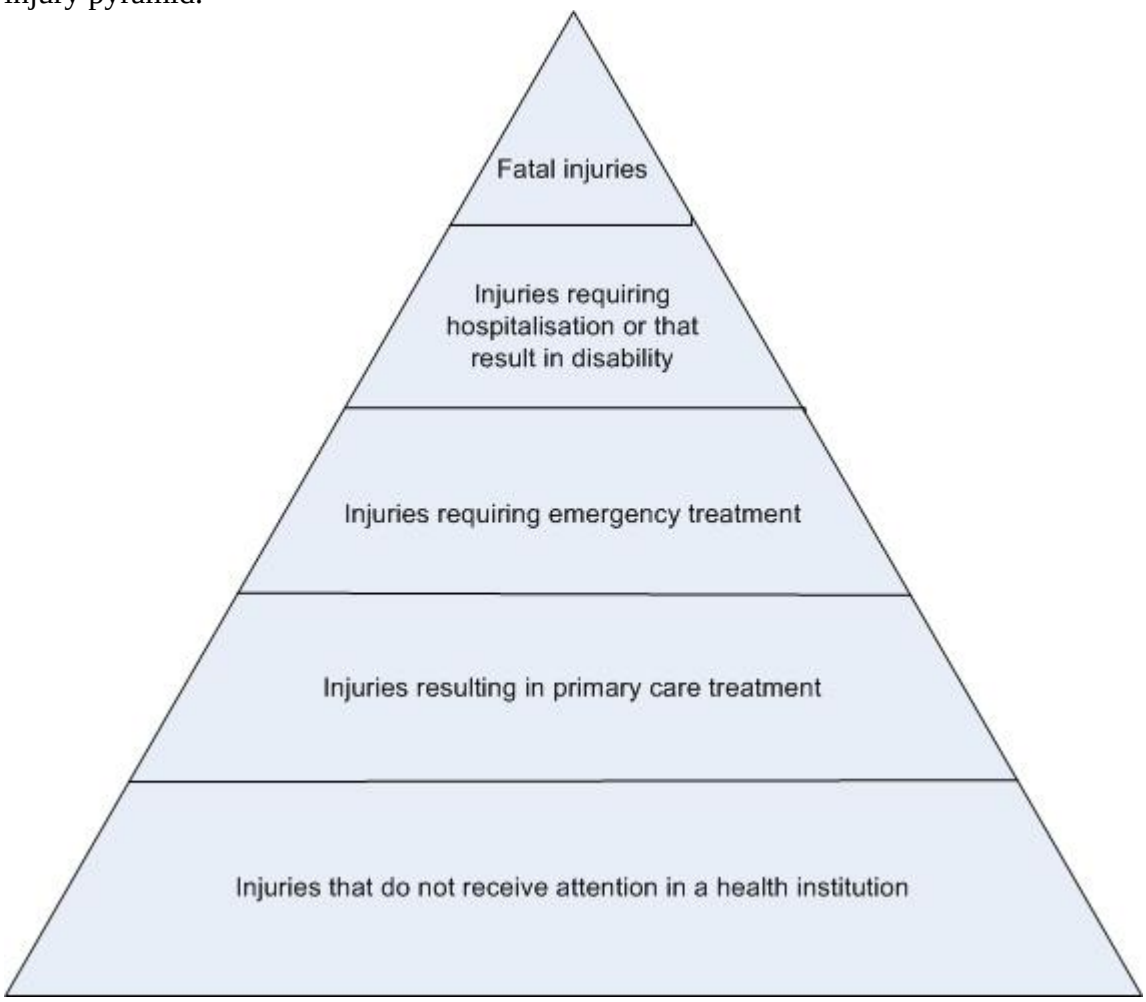

Figure 2: The Injury Pyramid. Adapted from: (Espitia-Hardeman & Paulozzi, 2005)

During the 2003/04 financial year, it was proposed that the 'comprehensive' system be implemented as the national chemical injuries surveillance system and extension of the system take place during this period. A report prepared for the MoH addressing this implementation and 2003 statistics was released in June 2004 (McDowell *et al.*, 2004) and a report on 2004 statistics was released in July 2005 (McDowell & Gallagher, 2005). The launch of the case report form for hazardous substance injury notifications via EpiSurv in September 2007 will ensure that all sectors of the injury pyramid (with the exception of injuries that do not receive medical attention which is virtually impossible to collect) will be captured by the CISS.

Previous to 1 July 2007, deaths were investigated under the Coroners Act 1988 and coronial files were stored at the CSO. Deaths investigated post 1 July 2007 are now to be accessed through the Coronial Services Case Register and access to and extraction from this register is under review. The case register is an interim solution pending the design and installation of any new database. The CISS can continue to collect data for deaths that occurred before 1 July 2007, and ESR will continue to liaise with personnel from the CSO in regard to future data provision for deaths occurring post 1 July 2007. For this reason, completeness of CSO mortality data for 2007 is likely to be less than the 50-60% that is usually estimated as only deaths prior to 1 July 2007 were able to be obtained.

During 2007 a review of the International Classification of Disease (ICD) version 10 (ICD-10) external cause codes incorporated in the CISS was undertaken. As a result, the list of codes has been expanded to be more comprehensive of the range of chemical and hazardous substances injuries that occur. The current codes can be found in Table 1.

From 2007 two additional data types are included in the CISS; ACC data and summarised media data. These data sources will be reviewed in the following year to gauge whether they should be included. With respect to the medium term strategy more details are given in Section 3 of this report.

A brief overview on the comprehensive surveillance system and the specific datasets are given in Section 2 of this report.

1.5. Other Approaches Trialled to Date

Prior to the comprehensive CISS, two other approaches were investigated; a) a paper and email based system and b) an electronic system. As further details on the first are given in a 2002 MoH report (Fowles *et al.*, 2002) and details on both are given in the 2003 MoH report (McDowell *et al.*, 2003), only a brief overview is given here.

1.5.1. Paper and Email Based System

- Trialled July-December 2001 in six PHUs.
- Modelled on the national notifiable disease system (EpiSurv).
- Level of notification varied greatly from region to region with only one (smaller) region providing sufficient data for subsequent analysis.
- Number of issues, principally time to complete paper forms.

1.5.2. Electronic System

- Electronic transfer of details from the hospital system.
- Cases to be identified based on ICD-10 codes.
- Discussion held regarding trialling at Middlemore Hospital but fields which could be obtained without significant additional funding would not differ to that sent to NZHIS as part of the National Minimum Data Set.
- Nationwide hospital survey indicated that the system could work but would require Information Technology changes to existing patient management systems (this would involve set up costs and/or ongoing funds).
- Thus with appropriate funding, an electronic system could potentially be implemented as hospitals update and renew their patient management systems.

1.6. Incorporation of the Email and Electronic Based Approaches into the Comprehensive Surveillance System

While not relying solely on PHU notification data to obtain a picture of the burden of disease from chemical injuries, the comprehensive system does incorporate data from this source.

Experiences with the paper based and electronic systems showed that no one approach would work in all settings and that local circumstance would dictate local data quality and capture practicalities. Thus the paper based or electronic systems may work for some PHUs and data capture by these or alternative means can be incorporated into the comprehensive system.

1.7. This Report

This report provides a brief overview of the comprehensive surveillance system before detailing its continuation during the 2007/2008 financial year. Summary statistics from the various data sources for 2007 are then presented as are additional CSO analyses pertaining to 2005 and 2006.

2. BACKGROUND OF THE COMPREHENSIVE CHEMICAL INJURY SURVEILLANCE SYSTEM

2.1. Introduction

A brief overview of the comprehensive system is given below. More detail can be sourced from the 2003 MoH report (McDowell *et al.*, 2003).

- Different health exposures and injuries result in different contacts with the health system, for example, some injuries may be attended to in the home, others would involve a visit to a General Practitioner and/or be hospitalised. Some health exposures and injuries may ultimately result in death with or without receiving medical attention. Data from several sources are therefore required to develop a comprehensive surveillance system.
- By implementing a surveillance system which encompasses several health outcomes (as opposed to just hospital morbidity for example) in addition to exposure and hazard data, a more complete picture of heath effects resulting from exposure to hazardous substances/chemicals can be achieved (Figure 2).
- The following data sources are incorporated into the comprehensive surveillance system: Coronial Services Office, New Zealand Health Information Service, Public Health Units, the National Poisons Centre, DriftNet, EpiSurv and Accident Compensation Corporation.

2.2. Coronial Services Office Data

- All deaths that result from acute chemical injury are deemed to be suspicious; therefore, a coroner's inquest should be completed.
- Files are stored at the national CSO in Wellington.
- Case demographics, circumstances surrounding death (including intent), and toxicology results are available from CSO files.
- Although initially obtained manually, ESR now receives most of this data electronically. ESR has been receiving CSO data since 2001.
- The main limitation associated with the coronial data is timeliness. It is estimated that by the end of a given year, approximately 50-60% of cases for that year are available. By the end of the following year, it is estimated that 90-95% of cases for the preceding year will have files readily accessible.
- The small number of chemical injury deaths means caution should be exercised when interpreting data, especially rates.

2.3. New Zealand Health Information Service Data

- Public hospitals are required to provide NZHIS with data known as the National Minimum Data Set (NMDS) for all **inpatients** (those admitted to hospital. Note that the criteria for classification as an inpatient differs between hospitals).

- Hospitalisations with International Classification of Disease (ICD) version 10 (ICD-10) external cause codes of interest (Table 1) are identified and the relevant data obtained from NZHIS.
- Data includes basic demographics, domicile code, admission and discharge date, ICD-10 codes (external cause codes and diagnosis codes) and free text fields.

Table 1: ICD-10 External Causes of Morbidity Codes of Interest for Chemical Injury Surveillance

ICD-10 Code	Description
Intentional poisoning by and exposure to:	
X60	Nonopioid analgesics, antipyretics and antirheumatics
X61	Antiepileptic, sedative-hypnotic, antiparkinsonism and psychotropic drugs, not elsewhere classified
X62	Narcotics and psychodysleptics [hallucinogens], not elsewhere classified
X63	Other drugs acting on the autonomic nervous system
X64	Other and unspecified drugs, medicaments and biological substances
X65	Alcohol
X66	Organic solvents and halogenated hydrocarbons and their vapours
X67	Other gases and vapours
X68	Pesticides
X69	Other and unspecified chemicals and noxious substances
X75	Intentional self-harm by explosive material
X76	Intentional self-harm by smoke, fire and flames
X83	Intentional self-harm by other specified means
Unintentional poisoning by and exposure to:	
X40	Nonopioid analgesics, antipyretics and antirheumatics
X41	Antiepileptic, sedative-hypnotic, antiparkinsonism and psychotropic drugs, not elsewhere classified
X42	Narcotics and psychodysleptics [hallucinogens], not elsewhere classified
X43	Other drugs acting on the autonomic nervous system
X44	Other and unspecified drugs, medicaments and biological substances
X45	Alcohol
X46	Organic solvents and halogenated hydrocarbons and their vapours
X47	Other gases and vapours
X48	Pesticides
X49	Other and unspecified chemicals and noxious substances
Poisoning by and exposure to (undetermined intent):	
W36	Explosion and rupture of gas cylinder
W37	Explosion and rupture of pressurized tyre, pipe or hose
W38	Explosion and rupture of other specified pressurized devices
W39	Discharge of firework
W40	Explosion of other materials
X04	Exposure to ignition of highly flammable material
X08	Exposure to other specified smoke, fire and flames
X20	Contact with venomous snakes and lizards
X21	Contact with venomous spiders
X22	Contact with scorpions
X23	Contact with hornets, wasps and bees
X24	Contact with centipedes and venomous millipedes (tropical)

X25	Contact with other venomous arthropods
X26	Contact with venomous marine animals and plants
X27	Contact with other specified venomous animals
X28	Contact with other specified venomous plants
X58	Exposure to other specified factors
Y25	Contact with explosive material
Y26	Exposure to smoke, fire and flames
Y33	Other specified events
Y86	Sequelae of other accidents
Y870	Sequelae of intentional self-harm, assault and events of undetermined intent
Y872	Sequelae of events of undermined intent
Y10	Nonopioid analgesics, antipyretics and antirheumatics
Y11	Antiepileptic, sedative-hypnotic, antiparkinsonism and psychotropic drugs, not elsewhere classified
Y12	Narcotics and psychodysleptics [hallucinogens], not elsewhere classified
Y13	Other drugs acting on the autonomic nervous system
Y14	Other and unspecified drugs, medicaments and biological substances
Y15	Alcohol
Y16	Organic solvents and halogenated hydrocarbons and their vapours
Y17	Other gases and vapours
Y18	Pesticides
Y19	Other and unspecified chemicals and noxious substances
Assault	
X85	Assault by drugs, medicaments and biological substances
X86	Assault by corrosive substance
X87	Assault by pesticides
X88	Assault by gases and vapours
X89	Assault by other specified chemicals and noxious substances
X96	Assault by explosive material
X97	Assault by smoke, fire and flames
Y08	Assault by other specified means
Y871	Sequelae of assault
Legal intervention	
Y351	Legal intervention involving explosives
Y352	Legal intervention involving gas
Y356	Legal intervention involving other specified means
Y890	Sequelae of legal intervention

Limitations associated with the NZHIS data:

- Only inpatients are captured, therefore those treated in emergency departments but not admitted are not included
- Criteria for classification as an inpatient vary between hospitals
- Often, only generic classification of the substances involved is available, rather than the specific substance name
- There is a time delay between presentation at hospital and availability of the data from NZHIS. This varies by area, but is generally less than one year
- The ICD-10-AM coding system is complex and inflexible. The current version is the 10th since ICD coding was first used in 1901.

2.4. Public Health Unit Data

- While a paper and email-based system piloted in 2001 was not universally successful, some PHUs currently operate their own local surveillance systems based on this approach.
- Any data, whether collected via a paper or electronic system can be incorporated into the comprehensive CISS.
- The quality, completeness and consistency of data collected vary between PHUs. Classification of intent can be problematic.

2.5. National Poisons Centre Data

- The NPC operates a 24 hours a day, 365 days per year telephone service that fields enquiries regarding **actual** or **potential** toxic exposures.
- While there is no requirement to phone the NPC in the event of a poisoning, about 21 000 phone calls are received each year.
- Details of calls are recorded in an electronic database.
- NPC also operates an Internet database known as TOXINZ.
- There is no clinical or laboratory confirmation of actual exposures.

2.6. DriftNet (Spraydrift) Data

- DriftNet is a surveillance system designed to monitor the incidence of spraydrift events with potential, reported or alleged health effects.
- Sourced from PHU staff who collect information on spraydrift complaints and incidents that are reported to them.
- Comparison with regional council data indicates that the DriftNet system is under utilised.

2.7. Chemical/Poison Related Notifiable Disease Data

- A number of chemical/poison related diseases are currently notifiable under the Health Act (1956).
- Sourced from EpiSurv – the national notifiable disease surveillance system.
- Diseases of interest include: decompression sickness, chemical poisoning from the environment, lead absorption, toxic shellfish poisoning and hazardous substances injury (hazardous substances injury is notifiable under the HSNO Act).
- As with communicable diseases there is likely to be a degree of under-reporting of chemical/poison related diseases. The extent to which the data reflect the true incidence of the disease burden is affected by many factors such as: public awareness of the injury, use of diagnostic facilities and the interest, resources and priorities of local public health units (see Institute of Environmental Science and Research, 2008 for a discussion of under-reporting).

2.8. Accident Compensation Corporation claim data

- The ACC administers New Zealand's accident compensation scheme, which provides personal injury cover for all New Zealand citizens, residents and temporary visitors to New Zealand.
- ACC is a crown entity and is responsible for many things including: paying compensation, buying health and support services to treat and care for injured people and providing injury prevention services.
- Data collected on accident compensation claims include demographics, ICD-10 diagnosis codes (external cause codes not assigned) and geographic details. Unfortunately not all claims are assigned an ICD-10 code and it is not possible to find out what proportion of claims this relates to. Where numbers of claims are less than or equal to three, the exact figure cannot be provided. For these reasons, when referring to ACC claim data in this report, the figures are often referred to as estimates.

3. PROGRESS ON NATIONAL IMPLEMENTATION AND DEVELOPMENT OF THE MEDIUM TERM STRATEGY, 2007/2008

National implementation of the comprehensive surveillance system was initiated in 2003/2004 following the successful pilot for the Auckland region. National data continues to be received on a quarterly basis from the NZHIS for inpatient hospitalisations and from the CSO for fatal chemical injury cases (note figures are not available for deaths post 1 July 2007). CISS datasets from these sources date back to 2001. National DriftNet (spraydrift) data date back to 1998. National NPC data for the period January to December 2007 was obtained for the first time in electronic format. From 2006, the CISS will also be reporting on a number of chemical/poison related notifiable diseases from EpiSurv.

Local chemical injury emergency department notifications from Auckland Regional Public Health Service (ARPHS) for Auckland City Hospital, and West Coast Public Health Unit (WCPHU) for Grey Hospital, also continue to be received on a regular basis. Datasets for both date back to 2003. The CISS also includes local injury notification data from Southland Public Health Unit (SOPHU) for Invercargill Hospital, for the years 2002-2007 and Regional Public Health (RPH) representing Capital and Coast DHB (Wellington and Kenepuru Hospitals) for the years 2005-2007. From 2004-2005 the CISS also incorporated data representing Hutt Valley DHB (this was not available for 2006 or 2007) and Wairarapa DHB for the years 2004-2006 (Masterton Hospital data not available for 2007).

Thus this report is able to document injury trends for the above four DHBs. The same four DHBs were represented in the 2006 report (Wairarapa DHB data were included in the 2006 Report, this data were not available for 2007), six DHBs for the 2005 report and only two DHBs (Auckland and West Coast) for the 2003 and 2004 reports. Historic PHU data for Southland, Capital and Coast, Hutt Valley and Wairarapa were reported in a bi-annual report released in January 2006 (McDowell, 2006).

The contributing DHBs are well representative of New Zealand, both on a geographic and population basis. Two of the four DHBs are based in the North Island, both of which represent large metropolitan centres. On a DHB population basis Auckland DHB is ranked fourth and Capital and Coast is ranked sixth out of all 21 DHBs. The other two DHBs represent smaller provincial and rural areas in the South Island. West Coast has the smallest population of all the DHBs and Southland is ranked 14/21. This cross-section of DHBs provides a useful sentinel surveillance system, which incorporated with the national datasets, provides useful analysis, which can contribute to the planning and implementation of policies and interventions.

However, the nature of the CISS is such that new datasets can be readily incorporated. Sourcing of further PHU/emergency department data continues and will be integrated when available.

The 2006 Annual CISS Report was the first time that a number of chemical/poison related notifiable diseases (under the Health Act) were incorporated. This adds another dimension to the comprehensive CISS and continues for the 2007 analysis. The chemical/poison related notifiable diseases (with the exception of hazardous substance injuries) will continue to be reported in the "Notifiable and Other Diseases in New Zealand Annual Report" (for example Institute of Environmental Science and Research, 2008).

A new notifiable disease that is incorporated in the 2007 Annual CISS Report is hazardous substances injury notifications from medical practitioners. In December 2005, an amendment to the HSNO Act was made that now requires all diagnosing medical practitioners, in addition to hospitals, to report injuries caused by hazardous substances to the Medical Officer of Health. However, the notification of diseases from substances not classified as hazardous substances is still not mandated. This would require changes to legislation outside of the HSNO Act, for example, the Health Act. A case report form for capturing hazardous substances injury notifications was incorporated into EpiSurv on 19 September 2007.

Under the Health Act, clinicians are required to notify certain scheduled medical diseases to the Medical Officer of Health. As of December 2007, laboratories are now required to report test results that indicate a person is or may be infected with a notifiable disease or illness to the Medical Officer of Health (Ministry of Health, 2007). The new legislative requirements will improve the old system and will lead to improvements in the rates of reporting. This is unlikely to impact on the 2007 CISS Annual Report numbers and rates but may lead to an increase in the numbers of notifiable diseases reported from 2008 onwards.

As recognised for several years, the most desirable means of capturing any notification data is via integration with patient management systems. ESR continues to investigate the potential of providing a web based reporting tool for direct reporting of notifications from medical practitioners. If a system is developed this could be expanded to include direct reporting from hospitals and medical practitioners for notifications of hazardous substance injuries. The major complication with this approach is that no one common patient management system is used by all hospitals, and even within the same hospital a different system may be used for emergency department patients and inpatients. Furthermore, General Practitioners use different systems again. Thus to have a nation wide integrated system would involve funding which is not presently available. With respect to the CISS, until a system is in place we will continue to seek permission to obtain emergency department electronic data extracts from those hospitals not currently covered by the CISS.

DriftNet data continue to be included in this report but as in previous years, the numbers of reported events are low. Comparison with regional council data indicates that the DriftNet system (employed in PHUs) is under-utilised. Therefore improved communication between regional councils and PHUs may enhance the referral of spraydrift incidents with health impacts to PHUs.

An additional data set which is incorporated for the first time in the 2007 CISS Annual Report is relevant claim data from the ACC. Although the data summarised in this report is not a true reflection of claims relating to chemical injury (due to issues surrounding data collection and provision, including: many of the claims do not have ICD codes, the ones that do have ICD codes only have the diagnosis code and not the external cause code, codes with a small number of claimants undergo rounding and it is not possible to analyse each claim individually, they are only aggregated to a larger grouping), it provides trends which highlight the number of people who have injuries from chemicals and hazardous substances that are severe enough to warrant accident compensation. The number reported here is therefore an under-representation of the true figure.

The 2007 CISS Annual Report is the first time a summary media analysis has been included. It is apparent that many chemical/poison related notifiable illnesses are reported in the media,

of which a minority are reported to EpiSurv. A short summary is included in this annual report to highlight the types of poison/chemical injuries that are reported in the media.

In 2006/2007, an internal review of the CISS was carried out by the CISS team to provide the MoH with a number of recommendations for enhancing the surveillance system. With respect to strategies listed in the 2006 CISS Annual Report (Tisch & Slaney, 2007) to be carried out in 2007/2008 most have been addressed. The review of the utilisation of the EpiSurv hazardous substances injury notification system will occur in 2008/2009. The CISS now receives ICD diagnosis codes and free text fields, and the development of an automated process for extracting further substance information was initiated in 2007/2008.
In 2008/2009, further strategies that will be developed include:

- Continue to investigate the potential of providing a web based reporting tool for hospitals and medical practitioners for directly notifying PHUs and ESR (on behalf of the MoH) of incidents of hazardous substance injuries
- Continue to develop an automated process to extract more specific substance information from NZHIS data using ICD diagnosis codes (as opposed to current external cause of injury code analysis) and corresponding diagnosis description text fields. Annually there are over 8000 inpatient hospitalisation records and an automated system is required if further substance analysis is to be carried out.

Although the CISS covers the majority of data sources explained in the injury pyramid (Figure 2), it is recognised that some of the data sources are not complete (for example, emergency department notifications are only received from five hospitals and a degree of under-reporting exists for spraydrift complaint and EpiSurv notifiable disease data). Given that the intent of the CISS is to examine mortality and morbidity associated with hazardous substances injuries in New Zealand, there is potential to look at additional or alternative surveillance methods for obtaining such data. In the future other techniques could be employed such as sentinel surveys of general and hospital based practitioners.

4. RESULTS FROM THE CHEMICAL INJURIES SURVEILLANCE SYSTEM FOR 2007

4.1. Introduction

National results for 2007 are presented for the CSO mortality data and NZHIS hospitalisation data by DHB, age, sex, ethnicity, intent and substance. Summarised results for spraydrift complaints, chemical/poison related notifiable diseases, National Poisons Centre call data, Accident Compensation Corporation data and a media analysis follow. A more detailed analysis of the combined datasets relating to injuries in children aged less than five years, poisonings involving paracetamol and ethanol and injuries caused by substances covered by the HSNO Act are then discussed. Finally, results from the CSO data for the years 2005 and 2006 are documented.

Chemical injury death statistics are those reported to the CSO as of 31 December 2007. Mortality data for 2007 would usually be estimated to be 50-60% complete (varies by DHB) due to time lags associated with this data. This dataset is further restricted due the unavailability of mortality data for those who died post 1 July 2007. This report uses 2006 census data and prioritised ethnicity to calculate rates.

4.2. Summary of Key Statistics

4.2.1. National Analysis

- See Appendix 1: Table 6, Table 7 and Table 12.
- 80 chemical injury deaths reported from the CSO for 2007, a rate of 2.0 per 100 000 population.
- 8606 poisoning hospitalisations (NZHIS) in 2007, a national rate of 213.6 per 100 000 population.
- 21 805 NPC calls categorised as human poisoning for 2007.
- 8 spraydrift complaints in 2007.
- 13 chemical poisoning from the environment notifications, no notifications of decompression sickness, 78 lead absorption notifications, 3 cases of toxic shellfish poisoning and 3 cases of hazardous substance injury were reported for 2007.
- Whanganui DHB had the highest chemical injury CSO rate (4.8 per 100 000, 3) (although caution should be noted when interpreting rates based on less than 10 deaths) while Tairawhiti, Wairarapa, West Coast and South Canterbury DHBs had no reported chemical injury deaths.
- West Coast DHB had the highest NZHIS poisoning hospitalisation rates (277.6 per 100 000, 87), with the lowest rate recorded from Capital and Coast DHB (103.1 per 100 000 population, 275).
- The majority of the CSO chemical injury deaths (56.3%, 45) and NZHIS poisoning hospitalisations (50.3%, 4329) were deemed intentional (however, 23 of the CSO deaths, and 1485 of the NZHIS hospitalisations were of unknown intent).

- The highest age-specific rate for the CSO data was the 45-64 years age group (3.5 per 100 000 population, 34) and 15-24 years for NZHIS (370.3 per 100 000 population, 2115).
- The majority of the CSO chemical injury deaths were male (63.8%, 51), however, the majority of NZHIS hospitalisations were female (59.6%, 5128).
- Where ethnicity was known, the majority of CSO deaths (77.6%, 59/76) and NZHIS hospitalisations (71.7%, 6086/8487) were for Europeans. Maori had the highest CSO mortality rate (2.7 per 100 000 population, 15) and NZHIS hospitalisation rate (245.2 per 100 000 population, 1386).
- The most common primary substance identified to be involved in chemical injury deaths was carbon monoxide (33.8%, 27), followed by ethanol (chronic) (7.5%, 6) and codeine (6.3%, 5).
- The most common NZHIS external cause code was X61 (Intentional self-poisoning by and exposure to antiepileptic, sedative-hypnotic, antiparkinsonism and psychotropic drugs, not elsewhere classified) (25.0%, 2153), followed by X60 (Intentional self-poisoning by and exposure to nonopioid analgesics, antipyretics and antirheumatics) (13.2%, 1138). Of the X61 poisonings where substance was known (679), the most common substance was zopiclone (21.2%, 144), followed by citalopram (9.4%, 64) and clonazepam (8.1%, 55).
- The most common substance identified in the NPC human exposure call data was paracetamol (5.2%, 1127), followed by dishwashing liquid (2.9%, 628) and ibuprofen (1.7%, 380).

4.2.2. Auckland DHB Analysis

- See Appendix 1: Table 6, Table 8 and Table 13.
- 7 deaths reported from CSO, a rate of 1.7 per 100 000 population.
- 936 NZHIS hospitalisations, a rate of 231.3 per 100 000 population.
- 2624 Auckland City Hospital injury notifications reported to ARPHS, a rate of 648.5 per 100 000 population.
- The majority of ARPHS notifications (46.6%, 1222) and NZHIS hospitalisations were intentional (51.4%, 481).
- The 15-24 years age group had the highest ARPHS age-specific notification rate (1609.2 per 100 000 population, 1082) and NZHIS hospitalisation rate (340.6 per 100 000 population, 229).
- The majority of ARPHS notification data was for males (55.9%, 1460), however, the majority of NZHIS hospitalisation data was for females (57.7%, 540).
- Where ethnicity was known, the majority of ARPHS notifications (66.1%, 1642/2485) and NZHIS hospitalisations (62.7%, 576/919) were for Europeans. Maori had the highest ethnic-specific ARPHS notification rate (1045.5 per 100 000 population, 312) and NZHIS hospitalisation rate (382.0 per 100 000 population, 114).
- The only primary substance that was identified more than once for the deaths was ethanol (28.6%, 2).
- Where substance was known (3016), the most common ARPHS substance was ethanol (54.2%, 1634), followed by paracetamol (4.5%, 137) and zopiclone (3.4%, 103).
- The most common NZHIS external cause code was X61 (Intentional self-poisoning by and exposure to antiepileptic, sedative-hypnotic, antiparkinsonism and psychotropic drugs, not elsewhere classified) (27.6%, 258), followed by X60 (Intentional self-poisoning by and exposure to nonopioid analgesics, antipyretics and antirheumatics) (13.1%, 123). Of the X61 poisonings where substance was known (109), the most

common substance was zopiclone (28.4%, 31), followed by clonazepam (11.0%, 12) and fluoxetine (9.2%, 10).

4.2.3. Capital and Coast DHB Analysis

- See Appendix 1: Table 6, Table 9 and Table 14.
- 8 deaths reported from CSO, a rate of 3.0 per 100 000 population.
- 275 NZHIS hospitalisations, a rate of 103.1 per 100 000 population.
- 576 Wellington and Kenepuru Hospital injury notifications reported to RPH, a rate of 216.0 per 100 000 population.
- The majority of RPH notifications (70.8%, 408) and NZHIS hospitalisations (62.9%, 173) were intentional.
- The 15-24 years age group had the highest RPH age-specific rate (481.5 per 100 000 cases, 204) and NZHIS hospitalisation rate (172.3 per 100 000 population, 73).
- The majority of RPH notifications (67.7%, 390) and NZHIS hospitalisations (64.4%, 177) were for females.
- Where ethnicity was known, the majority of RPH notifications (75.4%, 422/560) and NZHIS hospitalisations (71.8%, 191/266) were for Europeans. Maori had the highest ethnic-specific RPH notification rate (234.0 per 100 000 population, 62) and NZHIS hospitalisation rate (124.5 per 100 000 population, 33).
- Ethanol (chronic) was the most common primary substance identified in deaths (37.5%, 3).
- Where substance was known (689), the most common RPH substance was paracetamol (18.4%, 127) followed by zopiclone (7.8%, 54) and clonazepam (4.8%, 33).
- The most common NZHIS external cause code was X61 (Intentional self-poisoning by and exposure to antiepileptic, sedative-hypnotic, antiparkinsonism and psychotropic drugs, not elsewhere classified) (30.5%, 84), followed by X60 (Intentional self-poisoning by and exposure to nonopioid analgesics, antipyretics and antirheumatics) (19.6%, 54). Of the 84 X61 poisonings, the substance was known in only one hospitalisation, the substance was zopiclone.

4.2.4. West Coast DHB Analysis

- See Appendix 1: Table 6, Table 10 and Table 15.
- No deaths reported from CSO.
- 87 NZHIS hospitalisations, a rate of 277.6 per 100 000 population.
- 15 Grey Hospital injury notifications reported to WCPHU, a rate of 47.9 per 100 000 population.
- The majority of WCPHU notifications were intentional (60.0%, 9). Unintentional and intentional exposures were equal highest for NZHIS hospitalisations (for each: 40.2%, 35).
- The 15-24 years age group had the highest WCPHU age-specific notification rate (177.2 per 100 000 population, 6) and NZHIS hospitalisation rate (738.3 per 100 000 population, 25).
- The majority of WCPHU notifications (80.0%, 12) and NZHIS hospitalisations (51.7%, 45) were for females.
- All of the WCPHU notifications where ethnicity was known (4) were for Europeans. The majority of NZHIS hospitalisations were for Europeans (92.9%, 78/84).
- The most common WCPHU substances were codeine, ethanol, paracetamol and sodium valproate (for each: 9.4%, 3/32).

- The most common NZHIS external cause code was X61 (Intentional self-poisoning by and exposure to antiepileptic, sedative-hypnotic, antiparkinsonism and psychotropic drugs, not elsewhere classified) (17.2%, 15), followed by X60 (Intentional self-poisoning by and exposure to nonopioid analgesics, antipyretics and antirheumatics) (13.8%, 12). Of the X61 poisonings where substance was known (15), the most common substance was clonazepam (20.0%, 3), followed by buspirone, fluoxetine, sodium valproate and zopiclone (for each: 13.3%, 2).

4.2.5. Southland DHB Analysis

- See Appendix 1: Table 6, Table 11 and Table 16.
- 2 deaths reported from CSO, a rate of 1.9 per 100 000 population.
- 255 NZHIS hospitalisations, a rate of 238.7 per 100 000 population.
- 118 Invercargill Hospital injury notifications reported to SOPHU, a rate of 110.5 per 100 000 population.
- 74.6% (88) of SOPHU injury notifications were deemed intentional. Approximately a third of the NZHIS hospitalisations were determined to be intentional, unintentional and unknown.
- Highest age-specific injury rate was amongst the 15-24 years age group for SOPHU notifications (269.3 per 100 000 population, 37 cases) and amongst the 0-4 years age group for NZHIS hospitalisations (680.0 per 100 000 population, 47).
- The majority of SOPHU notifications (61.0%, 72) and NZHIS hospitalisations (60.0%, 153) were for females.
- Ethnicity data were not collected for SOPHU notifications. Where ethnicity was known the majority of NZHIS hospitalisations were for Europeans (84.5%, 212/251). Europeans also had the highest ethnicity-specific rate (240.6 per 100 000 population).
- The primary substance identified was different for the two deaths; carbon monoxide and temazepam.
- Where substance was known (170), the most common SOPHU substance was paracetamol (15.9%, 27), followed by ethanol (7.6%, 13) and citalopram (5.3%, 9).
- The most common NZHIS external cause code was X61 (Intentional self-poisoning by and exposure to antiepileptic, sedative-hypnotic, antiparkinsonism and psychotropic drugs, not elsewhere classified) (14.9%, 38), followed by Y11 (Poisoning by and exposure to antiepileptic, sedative-hypnotic, antiparkinsonism and psychotropic drugs, not elsewhere classified, undetermined intent) (9.4%, 24). Of the 38 X61 poisonings, substance was known for only one hospitalisation, the substance involved was carbamazepine.

4.2.6. Specific Analyses

4.2.6.1. Injuries in Children aged less than five years

- See Appendix 1: Table 7 and Table 18.
- No chemical injury deaths reported from the CSO.
- 825 NZHIS hospitalisations, a rate of 299.9 per 100 000 population (9.6% of total NZHIS poisoning hospitalisations).
- 63 injury notifications (PHU), a rate of 22.9 per 100 000 population (note, does not include ARPHS data as Starship Hospital data not available).

- The majority of NZHIS hospitalisations (94.4%, 779) and PHU notifications (81.0%, 51) were deemed unintentional. None of the NZHIS hospitalisations were deemed intentional and six of the PHU notifications were deemed intentional.
- The majority of NZHIS hospitalisations (55.9%, 461) and PHU notifications (58.7%, 37) were males.
- The majority of NZHIS hospitalisations (where ethnicity was known) were for Europeans (60.8%, 500), followed by Maori (24.3%, 200). This trend was also evident for Europeans for RPH notifications (68.9%, 31/45) (ethnicity data unavailable for SOPHU data and unknown for WCPHU data).
- Where substance was known (62), the most common substance notified to PHUs was paracetamol (19.4%, 12), followed by hydrocarbons (6.5%, 4) and carbamazepine, hyosciene butylbromide, temazepam, warfarin and zopliclone (for each: 3.2%, 2).

4.2.6.2.Paracetamol Poisonings

- See Appendix 1: Table 19.
- Paracetamol was not the primary substance identified in any deaths reported from the CSO.
- 294 PHU notifications involving paracetamol, a rate of 7.3 per 100 000 population.
- Paracetamol was ranked among the most common substances reported by PHUs (ranked first from RPH and SOPHU, first equal from WCPHU, and second from ARPHS).
- 89.1% (262) of the paracetamol notifications were deemed intentional (3.1% of the cases were of unknown intent).
- Those aged 15-24 years had the highest age-specific paracetamol poisoning rate (25.6 per 100 000 population, 146), followed by those aged 25-44 years (7.5 per 100 000 population, 85).
- The majority of PHU paracetamol poisoning cases were female (77.6%, 228).
- Where ethnicity was known, (88.4%, 260) Pacific Peoples (8.8 per 100 000 population, 20) and Asians (8.5 per 100 000 population, 29) had the highest ethnicity-specific paracetamol poisoning rates.

4.2.6.3.Ethanol Poisonings

- See Appendix 1: Table 20.
- 4 acute ethanol deaths reported from the CSO, all of unknown intent.
- Annual average of 11 acute ethanol deaths for years 2001-2006.
- 1670 PHU ethanol notifications for 2007 (note, all of these are ethanol when classed as food), a rate of 41.5 per 100 000 population.
- Ethanol was generally ranked among the most common substances reported by PHUs (ranked first from ARPHS, first equal from WCPHU, second from Southland, eighth from Capital and Coast).
- 8.2% (134/1634) of the ARPHS ethanol notifications were aged less than 18 years, a further 4 notifications in this age group were reported from other PHUs; RPH (3) and SOPHU (1).
- The majority of PHU ethanol notifications were intentional (23.1%, 386) (however, 548 of the poisonings were of unknown intent).
- Where sex was known (1663), approximately two thirds of the ethanol PHU notifications were male (65.5%, 1089).
- Where ethnicity was known (1550), approximately two thirds of the ethanol PHU notifications were Europeans (64.8%, 1005), followed by Maori (12.7%, 197). Pacific

Peoples had the highest ethnicity-specific rate (74.2 per 100 000 population, 168), followed by Asians (43.4 per 100 000 population, 148).

4.2.6.4. Injuries Involving HSNO Substances

- See Appendix 1: Table 21 and Table 22.
- A hazardous substance was the primary substance identified in 35 deaths during 2007, the majority being carbon monoxide (77.1%, 27), followed by petrol (11.4%, 4), butane (5.7%, 2), cyanide (2.9%, 1) and toluene (2.9%, 1).
- 158 PHU notifications involving 46 substances covered by the HSNO Act.
- 3 EpiSurv hazardous substances injury notifications.
- The most common HSNO substance reported to PHUs was methylated spirits (15.8%, 25), followed by carbon monoxide (13.3%, 21), methanol (13.3%, 21) and hydrocarbons (12.7%, 20).
- The majority of HSNO substance related deaths (85.7%, 30) and PHU injury notifications (74.1%, 117) were the result of intentional exposure.
- Where sex was known, the majority of HSNO substance related deaths (74.3%, 26) and PHU notifications (58.0%, 91/157) were males.
- The highest age-specific HSNO substance mortality rate was for the 25-44 years age group (1.2 per 100 000 population, 14), closely followed by the 45-64 years age group (1.1 per 100 000 population, 11). The highest age-specific HSNO substance PHU rate was for the 15-24 years age group (6.0 per 100 000 population, 34), closely followed by the 25-44 years age group (5.9 per 100 000 population, 67).
- Where ethnicity was known (33), the majority of HSNO substance deaths were for Europeans (78.8%, 26), followed by Maori (21.2%, 7). Maori had a slightly higher mortality rate (1.2 per 100 000 population) than Europeans (1.0 per 100 000 population). Where ethnicity was known (138), the majority of HSNO substance PHU notifications were for Europeans (59.4%, 82), followed by Asians (18.1%, 25). The highest ethnicity-specific rate was for Asians (7.3 per 100 000 population), followed by Pacific Peoples (4.4 per 100 000 population, 10).

4.2.7. Coronial Service Office Data for 2005 and 2006

- See Appendix 1: Table 24 to Table 27.
- There were 227 chemical injury deaths in 2005 and in 177 in 2006, with corresponding annual rates of 5.6 and 4.4 per 100 000 population respectively. CSO data are estimated to be 80-90% complete for 2005 and 2006.
- Approximately two thirds of the chemical injury deaths were intentional (2005: 64.3%, 146; 2006: 63.8%, 113). However, 18.9% (43) of the deaths in 2005 and 18.1% (32) of the deaths in 2006 were of unknown intent.
- Canterbury DHB had the greatest number of chemical injury deaths for 2005 (23) and 2006 (29). Whanganui DHB had the highest mortality rate in 2005 (12.9 per 100 000 population, 8) and West Coast DHB had the highest mortality rate in 2006 (9.6 per 100 000 population, 3).
- The mortality rate was highest in the 25-44 years age group in 2005 (9.3 per 100 000 population, 105) and in the 45-64 years age group in 2006 (6.7 per 100 000 population, 64).
- The majority of deaths in 2005 (74.0%, 168) and in 2006 (70.1%, 124) were males.
- The majority of deaths where ethnicity was known were for Europeans (2005: 80.5%, 173/215; 2006: 87.1%, 149/171). Europeans also had the highest ethnicity specific rate (2005: 6.4 per 100 000 population; 2006: 5.5 per 100 000 population).

- For 2005/2006 combined, just under half of the primary substances identified as involved in deaths (where substance class could be identified) were classed as household/domestic chemicals (48.1%, 189/393) followed by therapeutics (29.8%, 117/393) and chemicals/drugs of abuse (20.6%, 81/393).
- For 2005/2006 combined, the most common primary substance identified involved in the deaths was carbon monoxide (44.6%, 180/404), followed by methadone (6.2%, 25/404) and ethanol (5.9%, 24/404).
- For 2005/2006 combined, the primary substance identified involved in the intentional deaths was carbon monoxide (67.6%, 175/259), followed by amitriptyline (4.6%, 12/259) and hydrocarbons (3.1%, 8/259).
- For 2005/2006 combined, the primary substance identified involved in the unintentional deaths was methadone (22.9%, 16/70), followed by morphine or heroine (17.1%, 12/70), ethanol (11.4%, 8/70) and hydrocarbons (11.4%, 8/70).
- For 2005/2006 combined, a HSNO substance was the primary substance identified in 206 deaths.

4.3. Detailed National Analysis

The following section presents national chemical injury results for 2007 from the CSO, NZHIS, DriftNet, EpiSurv, and NPC data sources plus short ACC and media summary sections. While the NZHIS, DriftNet, chemical/poison notifiable disease and NPC datasets are complete for 2007, the CSO data are estimated to be between 50% and 60% complete. However, previous years results have shown that CSO demographic and substance trends may already be present. Relevant Appendix 1 tables are Table 6, Table 7 and Table 12.

4.3.1. CSO Mortality and NZHIS Hospitalisation Data

Overview

As of 31 December 2007, there have been 80 chemical injury deaths filed at the CSO for 2007, an annual rate of 2.0 per 100 000 population. Data for the years 2001-2006 indicate that approximately 224 chemical injury related deaths occur each year, an annual rate of 5.6 per 100 000 population.

There were 8606 NZHIS poisoning hospitalisations in 2007, a national rate of 213.6 per 100 000 population.

Age

The 15-24 years age group had the highest NZHIS age-specific hospitalisation rate (370.3 per 100 000 population, 2115), followed by the 0-4 years age group (299.9 per 100 000 population, 825) (Figure 3). The 15-24 years age group also had the highest intentional hospitalisation rate (228.1 per 100 000 population, 1303). The 45-64 years age group had the

highest age-specific mortality rate (3.5 per 100 000 population, 34), followed by the 25-44 years age group (2.6 per 100 000 population, 29).

Among children, one chemical injury death (in the 5-14 years age group) occurred. This follows the trend of low number of deaths for those aged less than 15 years in recent years (2006: 1; 2005: 2; 2004: 2). No children died aged less than five years, however, this age group had the second highest age-specific hospitalisation rate (299.9 per 100 000 population, 825; 5-14 years had the lowest age-specific rate of 70.9 per 100 000 population, 420). None of the NZHIS hospitalisations for the 0-4 years age group were deemed intentional, however, 36.2% (152) of the poisonings in the 5-14 years age group were.

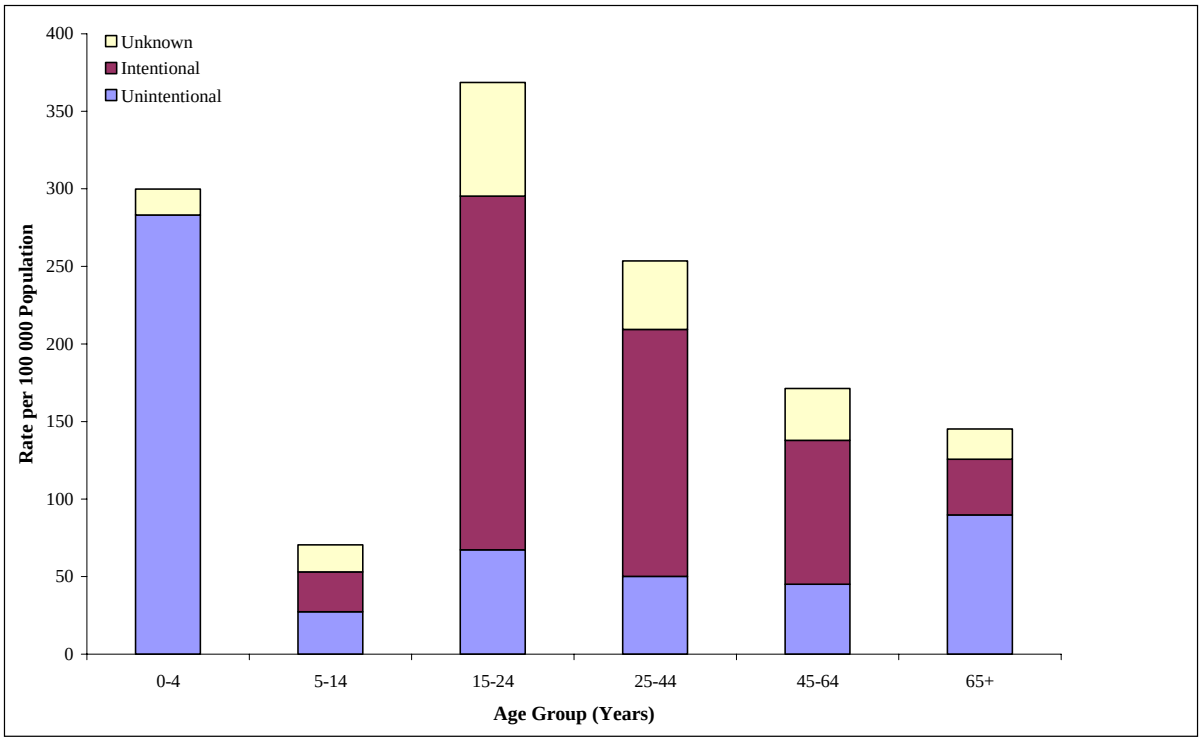

Figure 3: NZHIS Poisoning Hospitalisation Rate by Age Group and Intent, 2007

Sex

Clear sex differences are observed for both the CSO and NZHIS data; these differences are similar to those observed in previous years (Figure 4). Of the CSO deaths approximately two-thirds were male (63.8%, 51), this compares with only 40.4% (3478) of the NZHIS hospitalisations.

Of the CSO deaths, the number of males exceeded the number of females in each age group (with the exception of the 5-14 years age group). Of the NZHIS hospitalisations, the number of females exceeded the number of males in each age group (with the exception of the 0-4 years age group).

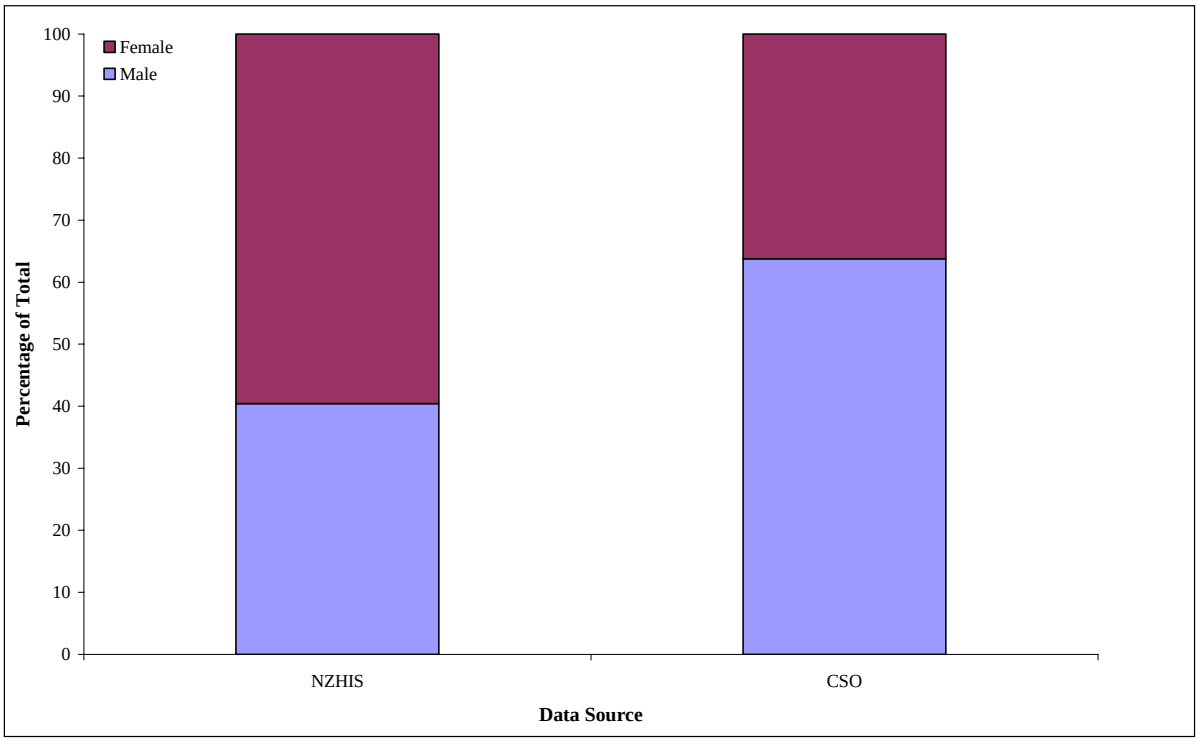

Figure 4: Percentage of Injuries by Sex for National CSO and NZHIS Data, 2007

Intent

The majority of the chemical injury deaths (56.3%, 45) and NZHIS poisoning hospitalisations (50.3%, 4329) were intentional (however, 23 of the deaths and 1485 of the NZHIS hospitalisations were of unknown intent). These figures are similar to CISS results from previous years.

When the deaths are analysed by intent and sex, the majority of both female and male deaths were intentional (44.8% and 62.7% respectively), however, a greater proportion of the female deaths were unintentional (24.1% and 9.8%, respectively). For the NZHIS hospitalisation data, the majority of female poisonings were intentional (59.4%, 3047), however for males, the majority of poisonings were unintentional (40.9%, 1421).

Ethnicity

Where ethnicity was known, Europeans accounted for the greatest number of CSO mortality deaths (77.6%, 59/76) and NZHIS hospitalisations (71.7%, 6086/8487). The highest ethnicity-specific rate was for Maori for both the CSO mortality data (2.7 per 100 000 population, 15) and the NZHIS hospitalisation data (245.2 per 100 000 population, 1386).

Substance

Where substance class was known, household/domestic chemicals accounted for the highest proportion of chemical injury deaths (41.8%, 33/79), followed by therapeutics (36.7%, 29) and chemicals/drugs of abuse (20.3%, 16). Similar to previous years, carbon monoxide was

the most common primary substance identified in chemical injury deaths (33.8%, 27), followed by ethanol (chronic) (7.5%, 6), hydrocarbons (petrol and butane) (7.5%, 6), and codeine (6.3%, 5). For these most common substances, the majority were intentional exposure (72.7%, 32/44).

The most common NZHIS external cause code was X61 (Intentional self-poisoning by and exposure to antiepileptic, sedative-hypnotic, antiparkinsonism and psychotropic drugs, not elsewhere classified) (25.0%, 2153), followed by X60 (Intentional self-poisoning by and exposure to nonopioid analgesics, antipyretics and antirheumatics) (13.2%, 1138). Of the 2153 X61 poisonings, the most common diagnosis codes were T424 (Benzodiazepines) (20.1%, 432), T426 (Other antiepileptic and sedative-hypnotic drugs) (20.0%, 430) and T432 (Other and unspecified antidepressants) (19.0%, 410). Of the X61 poisonings where substance was known (679), the majority were zopiclone (21.2%, 144), followed by citalopram (9.4%, 64) and clonazepam (8.1%, 55).

DHB rates

Figure 5 shows the geographic variability in the number of deaths and associated chemical injury mortality rates for 2007. The map indicates that no deaths were recorded for four DHBs as of 31 December 2007 (Tairawhiti, Wairarapa, West Coast and South Canterbury). The remaining DHBs had mortality rates ranging from 0.6 per 100 000 in Canterbury DHB (3) to 4.8 per 100 000 in Whanganui DHB (3). The greatest number of chemical injury deaths for 2007 occurred in Counties Manukau (8) and Capital and Coast (8) DHBs. Although Whanganui DHB had the highest mortality rate for 2007, in 2006, no chemical injury deaths were recorded in this DHB. This highlights the issue surrounding the small number of chemical injury deaths, and the caution required when interpreting rates. It is important to note that the timing of deaths filed at the CSO varies by coroners, this will influence counts by DHB for an incomplete year.

Figure 6 shows the number of NZHIS chemical injury hospitalisations and the corresponding rate by DHBs for 2007. Analysis of the 2007 NZHIS data by DHB showed that the West Coast DHB had the highest rate of poisoning hospitalisations (277.6 per 100 000 population, 87) followed by Wairarapa (263.9 per 100 000 population, 102) and Whanganui DHBs (263.7 per 100 000 population, 164). The lowest hospitalisation rate was recorded in Capital and Coast DHB (103.1 per 100 000 population, 275). When broken down by intent, MidCentral DHB had the highest hospitalisation rate resulting from intentional poisoning (152.4 per 100 000 population, 242), closely followed by Canterbury DHB (149.4 per 100 000 population, 697).

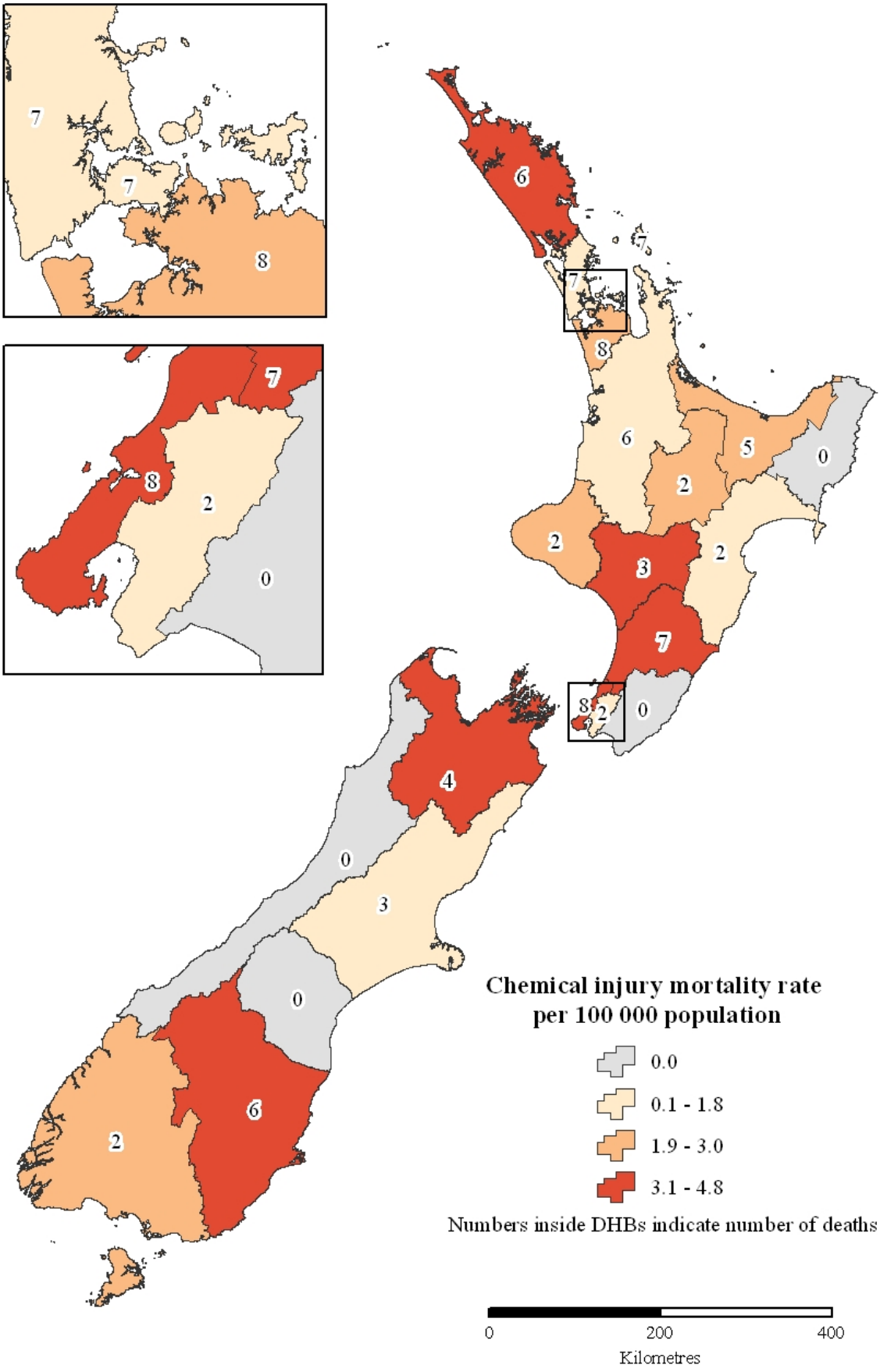

Figure 5: Number of CSO Chemical Injury Deaths and Rates by DHB, 2007

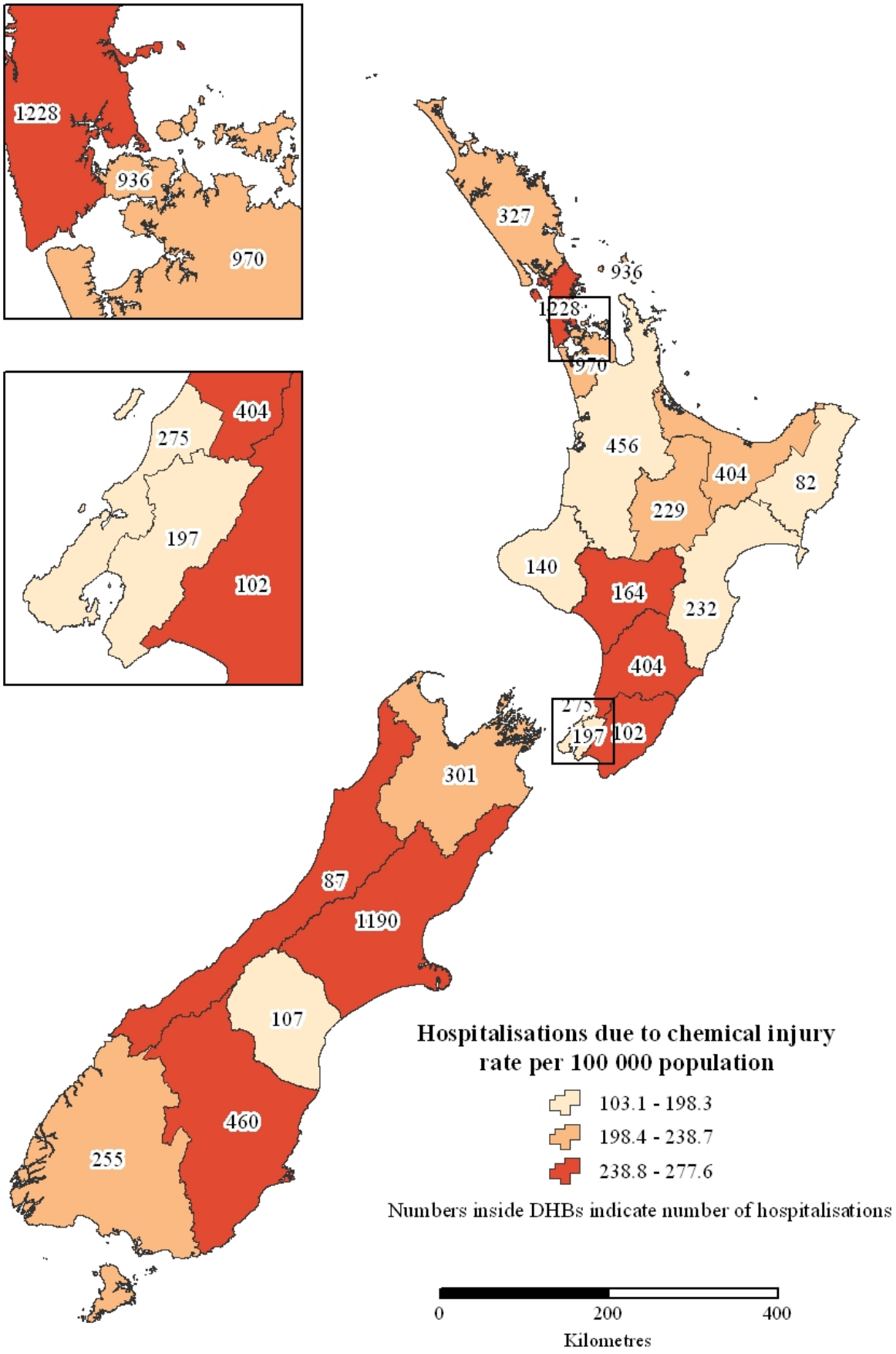

Figure 6: Number of NZHIS Chemical Injury Hospitalisations and Rates by DHB, 2007

4.3.2.Spraydrift

Eight spraydrift incidents were reported by PHUs during 2007. This is similar to the number reported during 2006 (7) and continues the low number of spraydrift notifications in recent years (Table 2). For the years 1998-2007, the average number of spraydrift complaints reported per year is 11.

Table 2: Number of Spraydrift Complaints Reported by Year

Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number of complaints	14	16	13	28	9	4	10	5	7	8

All of the spraydrift complaints for 2007 were reported from North Island PHUs (Table 3). The specific agrichemical associated with the spraydrift event was only known for three of the complaints. The majority of complaints involved symptoms resulting from spraydrift exposure, however, most of the complainants did not seek (or it was unknown whether they sought) medical attention.

Table 3: Summary of Spraydrift Complaints Reported for 2007

Location/PHU	Incident	Agrichemical	Symptoms/Damage	Cause
Waitakere TLA, Auckland Regional Public Health Service	In September a female complained of exposure to spraydrift	Glyphosate (Roundup®) and Metsulfuron (Mustang®)	Symptoms included tiredness, headache and aching muscles. Unknown whether complainant sought medical attention or whether there was damage to crops or property from the drift	Spraydrift from vehicle mounted spraying
Auckland TLA, Auckland Regional Public Health Service	In November a female complained of exposure to spraydrift	Fatty acids in the form of an emulsifiable concentrate (Agpro Bio-Safe®)	Symptoms included tiredness, headache and blurred vision. Unknown whether complainant sought medical attention or whether there was damage to crops or property from the drift	Spraydrift from vehicle mounted spraying
Hastings District TLA, Health Care Hawke's Bay	In December a woman and her children were exposed to spraydrift from a nearby orchard	Unknown	Symptoms included stinging and watering eyes	Spraydrift by unknown means
Hastings District TLA, Health Care Hawke's Bay	In September a woman complained of spraydrift onto her property	Unknown	Son had developed itching and asthma since spraying started in the previous two weeks	Spraydrift by unknown means
Thames-Coromandel District TLA, Waikato Public Health Unit	In June, a male complained of spraydrift onto his property from a neighbouring farm. His land includes a water catchment and after the spraying he noticed the water had a chemical taste to it and felt that it was undrinkable and informed his neighbours on the same water supply of this possible contamination. Water samples were collected and no Maximum Acceptable Values were exceeded in regards to determinants of Health Significance.	Unknown green fertiliser comprising of phosphate and pot ash	Unknown whether complainant sought medical attention or whether there was damage to crops or property from the drift	Spraydrift from aerial spraying

Tauranga District TLA, Toi Te Ora – Public Health	In August a female alleged systematic poisoning from spraying in the environment for herself and partner	Unknown organophosphate	Included partner coughing up blood	Spraydrift by unknown means
Tauranga District TLA, Toi Te Ora – Public Health	In September a male complained of spraydrift poisoning from a neighbouring kiwifruit orchard	Hydrogen Cyanamide (Hicane ®)	Symptoms included a red puffy face, bloodshot eyes and a sore throat. Alleges that symptoms occur each year. Complainant was diagnosed by a homeopath.	Spraydrift by unknown means
South Wairarapa District TLA, Wairarapa Public Health Unit	In December a female and three males were exposed to spraydrift	Unknown organic and seaweed sprays as well as other unknown conventional sprays	One of the complainants has seen a general practitioner and tests were run, results are not available. Unknown symptoms occurred prompting the tests.	Spraydrift by unknown means

4.3.3.Poison/Chemical Notifiable Disease Analysis

The following section details the 2007 notifications from EpiSurv for the following diseases/injuries: chemical poisoning from the environment, decompression sickness, lead absorption, toxic shellfish poisoning and hazardous substance injury (see also Institute of Environmental Science and Research, 2008).

From 3 September 2007, the non-occupational notifiable blood lead level was lowered from 0.72 to 0.48 µmol/l (Infectious and Notifiable Diseases Order 2007 amending Schedule 2 Section B of the Health Act 1956). This is therefore likely to lead to an increase in the numbers of lead absorption notifications henceforth.

The hazardous substance injury case report form went live in EpiSurv in September 2007.

Chemical poisoning from the environment

In 2007, 13 cases were notified as poisonings arising from chemical poisoning from the environment. This is lower than the number notified in 2006 (28) but higher than the number notified previously: two (2005), seven (2004), one (2003 and 2002), and four (2001 and 2000).

Cases were primarily notified from North Island DHBs: Waitemata (3), Auckland (1), Waikato (2), Bay of Plenty (1), Hutt Valley (1), Capital and Coast (4) and Canterbury (1). The number of notifications was similar for males (6) and females (5) (sex was unknown for 2 of the cases). Four cases were aged 10-14 years and the ages ranged from 11 to 79 (age was unknown for 1 case). Four cases were hospitalised from chemical contamination from the environment, three cases were not hospitalised, and it was unknown whether the remaining six cases were hospitalised. A range of substances resulted in the cases being poisoned, including: carbon monoxide (4), chlorine gas (2), mercury (2), asbestos (1), sodium silicate (1) and smoke from burning PVC pipe (1) (the substance was unknown for the remaining 2 cases).

Two outbreaks of chemical poisoning from the environment were reported involving six cases. The first outbreak occurred in Waitemata DHB when two children were accidentally exposed to chlorine gas at a local swimming pool. It is unknown whether the two females aged 11 and 13 were hospitalised. In 2006 two outbreaks as a result of chlorine gas poisoning in swimming pools occurred. The second outbreak occurred in Capital and Coast DHB when four Somali persons (aged between 14 and 37 years) were accidentally exposed to carbon monoxide fumes. A traditional type of brazier was used in the house using coal as the fuel source. The windows and doors were shut and the four persons fell asleep. All four were taken to Wellington Hospital with various symptoms of carbon monoxide poisoning: dizziness, headaches, nausea and vomiting. They were treated with oxygen and later discharged.

Decompression sickness

There were no cases of decompression sickness notified in 2007. This continues the trend of low numbers of decompression sickness notifications in recent years: one (2006 and 2005), none (2004), two (2003) and seven (2002). The highest number of notifications was recorded in 2001 (23 cases).

As with previous years, the annual number of hospitalisations for decompression sickness exceeds the annual number of notifications. Diagnosis of decompression sickness as the primary reason for admission (ICD-10-AM code T70.3) was specified in 12 cases for 2007. The number of hospitalisations ranges from seven in 2004 to 41 in 2002.

Lead absorption

There were 78 cases of lead absorption notified in 2007 (1.8 per 100 000 population), this is equal to the number notified in 2006. Only 67 (85.9%) of the cases for 2007 would have been reported under the previous threshold (0.72 µmol/L).

Of the 78 cases notified in 2007, six (7.7%) were aged less than ten years; one case was aged less than 1 year, four cases were aged 1-4 years and one case was aged 5-9 years. The highest number of notifications in children was recorded in 1999 (25) and the lowest in 2004, 2005 and 2007 (6).

The majority of lead absorption notifications were for males (83.3%, 65), compared with females (16.7%, 13). Ethnicity was recorded for 92.3% (72/78) of the cases. Of these responses, the majority of lead absorption notifications were reported for Europeans (91.7%, 66), followed by Maori and Pacific Peoples (for each: 4.2%, 3). Of the 61 cases for which hospitalisation status was recorded, two (3.3%) were hospitalised.

Table 4 and Table 5 summarise risk factor information for lead absorption cases notified in 2007. Several cases had more than one risk factor recorded. Similar to previous years, the most common risk factor for lead absorption for both adults and children was living in, or regularly visiting, a building build prior to 1970 that had paint chalking/flaking, and/or had recently undergone alteration or refurbishment.

Blood lead level concentrations were recorded for all of the notifications (the notifiable blood lead level is 0.48 µmol/l). Blood lead level concentrations ranged from 0.5 to 1.33 µmol/l with a median of 0.73 µmol/l. For adult notifications, blood lead level concentrations ranged from 0.5 to 8.0 µmol/l with a median of 1.0 µmol/l.

Table 4: Exposure to Risk Factors Associated with Lead Absorption for Adults (Cases aged 15 Years and over), 2007

Risk Factor	Yes	No	Unknown	%[a]
Case had exposure to lead through hobbies[b]	37	16	19	69.8
Case lived in or regularly visited a building built prior to 1970[c]	33	15	24	68.8
Case had exposure to high-risk occupation[d]	35	28	9	55.6
Close contact of case was occupationally exposed to lead	3	35	34	7.9

[a] "%" refers to the percentage of cases that answered "yes" out of the total number of cases for which this information was supplied. Several cases had more than one risk factor recorded.

[b] Hobbies were home renovations (24), shooting (10), making home ammunition (1), boat builder and repairer (1), lead lighting (1).

[c] Of these, 29 cases lived in or regularly visited a building that had paint chalking/flaking, and/or had recently undergone alterations or refurbishment.

[d] Occupations included painter (19), radiator repairs/mechanic (3), artist (1), boat builder and repairer (1), chemical plant worker (1), factory process worker (not elsewhere classified) (1), fitter and turner (1), general worker (1), demolition worker (1), landlord/home maintenance (1), panel beater and spray painter (1), self employed (not further defined) (1), steel cutter (1), unspecified (1).

Table 5: Exposure to Risk Factors Associated with lead Absorption for Children (Cases Aged Less Than 15 Years), 2007

Risk Factor	Yes	No	Unknown	%[a]
Case lived in or regularly visited a building built prior to 1970 that had paint chalking/flaking, and/or had recently undergone alterations or refurbishment	4	0	2	100.0
Pica behaviour	3	1	2	75.0
Case played in soil containing paint debris	2	1	3	66.6
Close contacts of case were exposed to lead through occupation	0	4	2	0.0
Case lived near an industry that is likely to release lead	0	4	2	0.0

[a] "%" refers to the percentage of cases that answered "yes" out of the total number of cases for which this information was supplied. Several cases had more than one risk factor recorded.

Toxic shellfish poisoning

There were three cases of toxic shellfish poisoning in 2007. This continues the trend of low numbers of toxic shellfish poisoning cases reported in past years. Since 1997, numbers of reported cases range from one in 1998, 2002 and 2006, to seven cases in 1999. A male (65 years) and female (64 years) from Taranaki DHB collected and consumed raw, boiled and marinated mussels while on holiday at Ohawe Beach. The type of toxic shellfish poisoning was unspecified. One case did not require hospitalisation and hospitalisation status was unknown for the other case. The remaining case was a male (41 years) from Hutt Valley DHB who purchased and consumed fried oysters in the Wellington CBD. The man was treated in Wellington Hospital for paralytic shellfish poisoning.

Hazardous substance injury

Three hazardous substance injury cases were notified during 2007. It is important to note that the case report form went live on the 19th September 2007 therefore data from all of 2007 will not be captured. Auckland Regional Public Health Service was the only PHU to enter Hazardous Substance Injury cases.

The first notification occurred when 150 litres of mixed chemicals (hydrofluoric acid and nitric acid) leaked from a faulty valve on a truck. The 39 year old male truck driver was showered with chemicals and was sent to Auckland City Hospital as a precaution. The second notification occurred when a 54 year old female was exposed to methyl bromide fumes as she opened a shipping container which contained furniture for her shop. She was not hospitalised. Several staff complained of nausea and dizziness but none of them sought medical attention. The final notification occurred when a 47 year old male was exposed to a methamphetamine/concrete mixture. The man is a maintenance engineer who destroys methamphetamine from clandestine labs. The process of disposing of methamphetamine involves mixing it with concrete. During this process it is assumed the concrete mixture came into contact with his skin through a hole in his protective overalls. He sustained superficial burns over his abdomen and was discharged from Middlemore Hospital the same day. All three injuries resulted from acute, accidental exposure.

4.3.4. National Poisons Centre call data

During 2007, the NPC received 32 985 phone calls (includes exposure calls, information calls and product enquires), of these, 22 276 related to actual exposures (including chronic exposures, acute human exposures and animal exposures). Acute human exposure calls accounted for 66.1% (21 805) of the total number of calls received.

Age

Where age was known (16 988), approximately two thirds of exposure phone calls were for those aged 0-4 years (66.4%, 11 275), followed by the 25-44 years (8.8%, 1499), and 5-14 years age groups (8.6%, 1466). The 0-4 years age group also had the highest age-specific rate (4098.9 per 100 000 population), followed by the 5-14 years (247.4 per 100 000 population, 1466) and 15-24 years age groups (226.6 per 100 000 population, 1294).

Intent

The NPC uses different definitions than the other CISS data sources for intent; in particular ‘abuse’ as well as ‘intentional’. Abuse would be classified as using any substance for any reason other that it is intended and also includes taking any amount of illicit substances. Intentional poisoning would be knowingly using a legal substance with the intent of harm or deliberate effect (Shieffelbien, 2007, 20 September). The majority of NPC human exposure phone calls were for child exploration (54.6%, 11 915), followed by unintentional exposures (33.9%, 7400). Intent was unknown for 0.9% (188) of the calls.

Sex

Where sex was known (21 272), the number of human exposure calls was similar for females (49.7%, 10 570) and males (50.3%, 10 702). The sex-specific rate was slightly higher for males (544.5 per 100 000 population) than females (512.5 per 100 000 population). The number of human exposure calls by intent was generally split evenly by sex with the exception of intentional exposures (70.7% female) and abuse exposures (66.2% male).

Ethnicity

The highest ethnicity-specific rate was for Europeans (264.0 per 100 000 population, 7112) followed by Maori (142.0 per 100 000 population, 803). It should be noted however, the majority of the NPC phone call data are classified as of unknown ethnicity (59.6%, 13 003).

Substance

Paracetamol was the most common substance involved in human exposure calls to the NPC (5.2%, 1127) followed by dishwashing liquid (2.9%, 628), ibuprofen (1.7%, 380) and silica gel (1.6%, 350). Half of the top 10 substances were classified as therapeutics (paracetamol, ibuprofen, zopiclone, diclofenac and amoxicillin) followed by household chemicals (dishwashing liquid, silica gel, petrol and sodium hypochorite).

4.3.5. ACC Analysis

During 2007, there were approximately 558 ACC claims relating to chemical injuries, a rate of 13.9 per 100 000 population (Table 23). There were more male (54.1%, 302) than female (45.9%, 256) ACC claims. Males also had a higher rate (15.4 versus 12.4 per 100 000 population).

Approximately half of the claims (48.4%, 270) related to 'toxic effects of substances chiefly non-medicinal as to source' (ICD-10 diagnosis codes T51.0 – T65.9), followed by 'poisoning by drugs, medicaments and biological substances' (ICD-10 diagnosis codes T36.0 – T50.9) (40.9%, 228). Of particular interest is that although no decompression sickness notifications were reported in EpiSurv for 2007, approximately 29 claims were received.

4.3.6. Media Analysis

During 2007, media articles of interest were collected to help illustrate the degree of underreporting of chemical poisoning from the environment and hazardous substances injury cases to EpiSurv. Media articles ranged from a woman who was seriously disfigured when a barman threw methylated spirits over a flaming cocktail (NZPA, 2007a), to children who were admitted to Starship Hospital after swallowing Bindeez Beads which were found to contain toxic chemicals (One News, 2007), and a toddler was exposed to sulphuric acid at a local playground (NZPA, 2007b). In these instances human health effects were documented or the persons involved visited a healthcare institution. A selection of the injuries caused by hazardous substances are documented below, none of these were reported via EpiSurv.

During 2007 a number of newspapers reported various incidents of clandestine methamphetamine laboratories exploding, harming those inside. On May the 6th, two men were left critically injured with severe burns when a portable building they were making methamphetamine in exploded, one of the men later died (Marshall & Woulfe, 2007; NZ Herald Staff & NZPA, 2007). Toxic, volatile and dangerous chemicals in such laboratories can be ignited by the smallest spark or ignition source.

On June the 9th, 11 passengers were treated for carbon monoxide inhalation in Blenheim after dining on a local river boat (Moss, 2007). Low tide and the calm conditions meant that exhaust fumes from the outboard motor kept pace with the boat and fumes gradually built up inside the cabin. Ten of the passengers were taken to Wairau Hospital and were discharged that night, the remaining individual left hospital the next day.

Two occupants of an Ohope home were taken to hospital after their house was allegedly smeared with a toxic chemical, believed to be cyanide on October the 9th (Watt & NZPA, 2007). The couple were taken to Whakatane Hospital suffering from the effects of the substance including a burning sensation in the throat and were discharged later that day.

A young man was overcome by methane fumes while exploring an abandoned Otago mine in December 2007 (NZPA, 2007c). After venturing into the mine the individual began feeling light-headed and then fell unconscious as a result of the fumes from the methane gas which displaces oxygen.

The incidents above are a summary of the many chemical and hazardous substance injuries which are reported in the media that are not notified to the local PHUs for reporting via EpiSurv.

4.4. Detailed Auckland DHB Analysis

Overview

Seven chemical injury deaths were reported for Auckland DHB for 2007, a rate of 1.7 per 100 000 population. On average, 24 chemical injury deaths have been reported per year between 2001 and 2006 for this region. Two persons were aged 25-44 years, and the remaining five were aged 45-64 years. The majority of deaths were male (5). Two of the deaths were intentional, one was unintentional, and intent was unknown for the remaining four deaths. Three people were of European ethnicity, two were Maori, one was Asian and ethnicity was unknown for one person. Ethanol was primarily identified in two deaths, the remaining substances were the primary substances identified in one death each: carbon monoxide, codeine, toluene, methadone and quetiapine.

There were 936 NZHIS poisoning hospitalisations reported for Auckland DHB during 2007, a rate of 231.3 per 100 000 population. Auckland DHB is ranked 11/21 when DHBs are ordered from highest to lowest rate.

A total of 2624 Auckland City Hospital emergency department attendance notifications were received by ARPHS for 2007, a rate of 648.5 per 100 000 population. This continues the trend of an annual increase in the number of injury notifications by ARPHS in recent years

(2006: 446.6 per 100 000 population, 1807; 2005: 376.4 per 100 000 population, 1523; and 2004: 327.2 per 100 000 population, 1324).

It should be noted that ARPHS receives injury notifications from Auckland City Hospital only, thus representing just Auckland DHB (one of the three DHBs in the greater Auckland area). These data are incomplete for children as the majority of these cases are seen at Starship Children's Hospital and notification data from this hospital are not routinely received by ARPHS.

Age

The 15-24 years age group had the highest age-specific NZHIS hospitalisation rate (340.6 per 100 000 population, 229), closely followed by the 0-4 years age group (330.1 per 100 000 population, 86). The highest ARPHS age-specific notification rate was for the 15-24 years age group (1609.2 per 100 000 population, 1082) followed by the 25-44 years age group (738.0 per 100 000 population, 1005).

Intent

The majority of NZHIS hospitalisations (51.4%, 481) and ARPHS notifications were for intentional poisoning (46.6%, 1222), intentional poisoning also had the highest rate (118.9 per 100 000 population and 302.0 per 100 000 population, respectively). One assault by means of 'drugs, medicaments and biological substances' (ICD X85) was recorded. It should be noted that almost a quarter of the ARPHS notifications (24.1%, 633) were of unknown intent.

Sex

The majority of NZHIS hospitalisations were for females (57.7%, 540). Females also had a higher sex-specific rate (260.4 versus 200.8 per 100 000 population). Where sex was known (2614) for ARPHS notifications however, the majority were for males (55.9%, 1460). The sex-specific rate was also higher for males (740.3 versus 556.5 per 100 000 population, respectively).

Ethnicity

Where ethnicity was known, the majority of NZHIS hospitalisations (62.7%, 576/919) and ARPHS notifications (66.1%, 1642/2485) were for Europeans. The highest ethnic-specific rate was for Maori for both the NZHIS hospitalisations (382.0 per 100 000 population, 114) and ARPHS notifications (1045.5 per 100 000, 312).

Substance

The most common NZHIS external cause code was X61 (Intentional self-poisoning by and exposure to antiepileptic, sedative-hypnotic, antiparkinsonism and psychotropic drugs, not elsewhere classified) (27.6%, 258), followed by X60 (Intentional self-poisoning by and exposure to nonopioid analgesics, antipyretics and antirheumatics) (13.1%, 123). Of the 258

X61 poisonings, the most common diagnosis code was T426 (Other antiepileptic and sedative-hypnotic drugs) (27.9%, 72), followed by T424 (Benzodiazepines) (20.9%, 54). Of the X61 poisonings where substance was known (109), the most common substance was zopiclone (38.4%, 31), followed by clonazepam (11.0%, 12) and fluoxetine (9.2%, 10).

Where substance class was known (2973), the most common substance class for ARPHS notifications was chemicals/drugs of abuse (67.0%, 1993), followed by therapeutics (31.3%, 932). Where substance was known (2963), the most common ARPHS notification substance was ethanol (55.1%, 1634), followed by paracetamol (4.6%, 137) and zopiclone (3.5%, 103).

4.5. Detailed Capital and Coast DHB Analysis

Overview

Eight chemical injury deaths were reported for Capital and Coast DHB for 2007, a rate of 3.0 per 100 000 population. On average, 12 chemical injury deaths have been reported per year between 2001 and 2006 for this region. Two persons were aged 25-44 years, five were aged 45-64 years and one was aged greater than 65 years. The majority of deaths were male (62.5%, 5). All eight persons were of European ethnicity. Ethanol (chronic) was the most common substance that was primarily identified in the deaths (37.5%, 3), followed by morphine or heroin (25.0%, 2), carbon monoxide (25.0%, 2) and codeine (12.5%, 1).

There were 275 NZHIS hospitalisations recorded for Capital and Coast DHB, a rate of 103.1 per 100 000 population. This is the lowest NZHIS hospitalisation rate by DHB for 2007.

A total of 576 Wellington City and Kenepuru Emergency Department notifications were reported to RPH for 2007, a rate of 216.0 per 100 000 population. The number and rate is higher than that observed for 2006 (166.5 per 100 000 population, 444).

Age

The highest age-specific NZHIS hospitalisation rate was for the 15-24 years age group (172.3 per 100 000 population, 73), followed by the 25-44 years age group (125.4 per 100 000 population, 107). The highest age-specific RPH notification rate was for the 15-24 years age group (481.5 per 100 000 population, 204) followed by the 0-4 years age group (256.9 per 100 000 population, 45).

Intent

The majority of NZHIS hospitalisations (62.9%, 173) and RPH notifications were for intentional exposure (70.8%, 408). Intentional exposure also had the highest rate for both the NZHIS hospitalisations (64.9 per 100 000 population) and RPH notifications (153.0 per 100 000 population). Unknown intention accounted for 14.9% (41) of NZHIS hospitalisations and 2.4% (14) of RPH notifications.

Sex

Females accounted for the majority of NZHIS hospitalisations (64.4%, 177) and RPH notifications (67.7%, 390). The sex-specific rate was highest for females for both the NZHIS hospitalisations (128.1 per 100 000 population) and RPH notifications (282.3 per 100 000).

Ethnicity

Where ethnicity was known, approximately three-quarters of the NZHIS hospitalisations (71.8%, 191/266) and RPH notifications (75.4%, 422/560) were for Europeans. The highest ethnic-specific rate was for Maori for both the NZHIS hospitalisations (124.5 per 100 000 population, 33) and RPH notifications (234.0 per 100 000, 62).

Substance

The most common NZHIS external cause code was X61 (Intentional self-poisoning by and exposure to antiepileptic, sedative-hypnotic, antiparkinsonism and psychotropic drugs, not elsewhere classified) (30.5%, 84), followed by X60 (Intentional self-poisoning by and exposure to nonopioid analgesics, antipyretics and antirheumatics) (19.6%, 54). Of the 84 X61 poisonings, the most common diagnosis codes were T426 (Other antiepileptic and sedative-hypnotic drugs) (26.2%, 22), followed by T424 (Benzodiazepines) (16.7%, 14). Of the 84 X61 poisonings, the substance was known in only one hospitalisation, the substance was zopiclone.

Where substance class was known (693) the most common substance class for RPH notifications was therapeutics (85.1%, 590) followed by chemicals/drugs of abuse (9.2%, 64). Where substance was known (689), the most common RPH substance notification was paracetamol (18.4%, 127), followed by zopiclone (7.8%, 54), clonazepam (4.8%, 33), quetiapine (4.4%, 30) and ibuprofen (4.2%, 29).

4.6. Detailed West Coast DHB Analysis

Overview

There we no chemical injury deaths reported for West Coast DHB in 2007. On average three chemical injury deaths per year have been reported between 2001 and 2006 for this region.

There were 87 NZHIS hospitalisations recorded for West Coast DHB in 2007, a rate of 277.6 per 100 000 population. This is the highest hospitalisation rate by DHB for 2007.

The WCPHU received 15 emergency department notifications (47.9 per 100 000 population) from Grey Hospital relating to chemical injury during 2007. This is similar to the number notified in 2006 (11) and considerably lower than the number of notifications from Grey Hospital in recent years (34 in 2005, 35 in 2004 and 47 in 2003).

Intent

For the NZHIS hospitalisations, intentional (40.2%, 35) and unintentional (40.2%, 35) exposures were equal as the most common intent. The majority of WCPHU injuries were intentional (9/15, 60.0%).

Sex

There were approximately equal numbers of female (51.7%, 45) and male (48.3%, 42) NZHIS hospitalisations. The majority of WCPHU injuries however were females (80.0%, 12). Females had the highest NZHIS hospitalisation (291.8 per 100 000 population) and WCPHU (78.1 per 100 000 population) sex-specific rate.

Age

The highest ages-specific rate for NZHIS hospitalisations was for the 15-24 years age group (738.3 per 100 000 population, 25), followed by the 0-4 years age group (316.5 per 100 000 population, 6). The highest age-specific WCPHU notification rate was for the 15-24 years age group (177.2 per 100 000 population, 6).

Substance

The most common NZHIS external cause code was X61 (Intentional self-poisoning by and exposure to antiepileptic, sedative-hypnotic, antiparkinsonism and psychotropic drugs, not elsewhere classified) (17.2%, 15), followed by X60 (Intentional self-poisoning by and exposure to nonopioid analgesics, antipyretics and antirheumatics) (13.8%, 12). Of the 15 X61 poisonings, the most common diagnosis codes were T426 (Other antiepileptic and sedative-hypnotic drugs) (26.7%, 4) and T432 (Other and unspecified antidepressants) (26.7%, 4). Of the X61 poisonings where substance was known (15), the most common substance was clonazepam (20.0%, 3), followed by buspirone, fluoxetine, sodium valproate and zopiclone (for each: 13.3%, 2).

Therapeutic substances were associated with the majority of the WCPHU notifications (27/32, 84.4%). Codeine, ethanol, paracetamol and sodium valproate were the most common substances involved in the injuries (for each: 9.4%, 3/32).

4.7. Detailed Southland DHB Analysis

Overview

In 2007, there were two chemical injury deaths reported for Southland DHB, a rate of 1.9 per 100 000 population. On average seven deaths have been reported per year between 2001 and 2006 for this region. One male and one female death occurred; one death was reported for the 15-24 years and 45-64 years age groups. Both of the deaths were for persons of European ethnicity. One death was the result of carbon monoxide, the other death the result of temazepam poisoning. Both of the deaths were deemed intentional.

There were 255 NZHIS poisoning hospitalisations recorded for Southland DHB for 2007, a rate of 238.7 per 100 000 population. Southland DHB is ranked 8/21 when DHBs are ordered from highest to lowest hospitalisation rate.

118 injury notifications (110.5 per 100 000 population) from Invercargill Hospital were received by SOPHU, this is lower than the number notified in recent years (2006: 136, 127.6 per 100 000 population; 2005: 201, 188.6 per 100 000 population; 2004: 185, 173.6 per 100 000 population; and 2003: 188, 181.9 per 100 000 population).

Age

The highest age-specific NZHIS hospitalisation rate (680.0 per 100 000 population, 47) occurred in the 0-4 years age group. This was followed by the 15-24 years age group (429.5 per 100 000 population, 59). For the SOPHU notifications, the 15-24 years age group had the highest age-specific injury rate (269.3 per 100 000 population, 37) followed by the 0-4 years age group (245.9 per 100 000 population, 17).

Sex

The number of female injury notifications greatly outnumbered the number of male injury notifications for both the NZHIS hospitalisations (153 and 102, respectively) and SOPHU notifications (72 and 46 respectively).

Intent

The numbers of NZHIS hospitalisations were split approximately evenly between intentional (30.6%), unintentional (34.5%) and unknown (34.9%) exposures. Three-quarters of the SOPHU injuries were intentional (74.6%, 88).

Ethnicity

Where ethnicity was known (251), the majority of NZHIS hospitalisations were for Europeans (84.5%, 212), Europeans also had the highest ethnicity-specific rate (240.6 per

100 000 population). Ethnicity data was not collected by SOPHU for the emergency department notifications.

Substance

The most common NZHIS external cause code was X61 (Intentional self-poisoning by and exposure to antiepileptic, sedative-hypnotic, antiparkinsonism and psychotropic drugs, not elsewhere classified) (14.9%, 38), followed by Y11 (Poisoning by and exposure to antiepileptic, sedative-hypnotic, antiparkinsonism and psychotropic drugs, not elsewhere classified, undetermined intent) (9.4%, 24). Of the 38 X61 poisonings, the most common diagnosis codes were T424 (Benzodiazepines) (15.8%, 6), T430 (Tricyclic and tetracyclic antidepressants) (15.8%, 6) and T432 (Other and unspecified antidepressants) (15.8%, 6). Of the 38 X61 poisonings, substance was known for only one hospitalisation, the substance involved was carbamazepine.

Where substance class was known (170), the majority of SOPHU notification substances were classed as therapeutics (75.9%, 129) followed by chemicals/drugs of abuse (14.1%, 24) and household/domestic chemicals (7.6%, 13). Where substance was known (170), paracetamol was the most common substance (15.9% 27), followed by ethanol (7.6%, 13) and citalopram (5.3%, 9). Paracetamol was also the most common intentional substance that resulted in SOPHU notification (17.3%, 24) and was ranked first equal with sodium hypochlorite (for each: 14.3%, 2) for unintentional exposures.

4.8. Specific Analyses

Inclusion of several datasets in a comprehensive surveillance system enables comparison of data relating to specific public health issues to be investigated. The resulting picture is therefore more representative of the associated burden of injury than would have been obtained when examining each dataset separately. This is illustrated in the following examples: injury in children aged less than five years, poisonings involving paracetamol or ethanol, and injuries caused by substances covered by the HSNO Act.

4.8.1. Injuries in Children Aged Less than Five Years

Details on cases aged less than five years are presented in Appendix 1 Table 17 and Table 18. CSO and ARPHS data are excluded from this analysis; for CSO no cases for this age group were reported as of 31 December 2007, and for ARPHS notifications from Starship Children's Hospital are not received.

In 2007, there were 825 NZHIS poisoning hospitalisations involving children less than five years of age (9.6% of total NZHIS poisoning hospitalisations). The corresponding age-specific poisoning rate for 2007 was 299.9 per 100 000 population. As expected, none of the NZHIS hospitalisations in this age group were intentional. Where ethnicity was known (822), the majority of hospitalisations were for Europeans (60.8%, 500) followed by Maori (24.3%, 200).

Sex trends were similar for the NZHIS and PHU datastets in this age group; the number of males exceeded females (NZHIS: 55.9%, 461; PHU: 58.7%, 37/63).

Sixty three children aged less than five years presented to the emergency department of Wellington, Kenepuru, Grey and Invercargill Hospitals, some of these children had consumed multiple substances. Of the 62 known substance occurrences (45 individual substances) notified from the PHUs for children aged less than five years, 19.4% (12) involved paracetamol. Other prominent substances included hydrocarbons (6.5%, 4) and carbamazepine, hyosciene butylbromide, temazepam, warfarin and zopiclone (for each: 3.2%, 2).

4.8.2. Paracetamol Poisonings

Summary demographic data on paracetamol poisonings for 2007 are presented in Appendix 1 Table 19. As of 31 December 2007 there were no deaths in 2007 where the primary substance identified was paracetamol. For the PHU data, paracetamol was either the most common or second most common of the identifiable substances for all the PHUs.

In total, there were 294 notifications of paracetamol poisoning, of which 137 were reported from Auckland City Hospital (up from 131 reported in 2006), this represents 4.5% of total substances for that hospital. The Wellington hospitals reported a total of 127 paracetamol poisonings (up from 88 reported in 2006), this represents 18.4% of the total substances for that hospital. Grey Hospital reported three paracetamol poisonings during 2007 (up from no paracetamol poisonings in 2006), this represents 9.4% of the total substances for that hospital. Invercargill Hospital reported 27 paracetamol poisonings (up from 25 reported in 2006), this represents 15.9% of the total substances for that hospital.

The majority of the paracetamol notifications for all hospitals were deemed intentional (89.1%, 262) (however, 9 of the 294 hospitalisations were of unknown intent). A large percentage of the PHU paracetamol notifications were from the 15-24 year age group (Auckland City Hospital: 48.9%, 67; Wellington Hospitals: 52.0%, 66; Grey Hospital: 33.3%, 1 and Invercargill Hospital: 44.4%, 12). Across all hospitals, 77.6% (228) of the paracetamol notifications were female. The majority of notifications involved persons of European ethnicity (where ethnicity was known) (70.0%, 182/260).

4.8.3. Ethanol Poisonings

Summary demographic data on acute ethanol poisonings for 2007 are presented in Appendix 1 Table 20. As of 31 December 2007 ethanol (acute poisoning) was the primary substance identified in four deaths filed at the CSO for 2007 (5.0% of the total chemical injury deaths). Acute ethanol poisoning is the primary substance identified in an average of 11 deaths per year (based on 2001-2006 data). All of the acute ethanol related deaths for 2007 were of unknown intent. The deceased were aged between 45 and 60, all male. Three were of European ethnicity and one of Asian ethnicity. There were also six deaths during 2007 where the primary substance identified was ethanol but as a result of chronic abuse (as opposed to acute poisoning).

In 2007, there were 1634 ethanol notifications (54.2% of the total substances) from Auckland City Hospital. The number of notifications for the remaining three DHBs ranged from three (Grey Hospital) to 20 (Wellington Hospitals), totalling 36. Ethanol consistently appears relatively high up the list for the number of notifications; it was the most common substance

for Auckland City, first equal most common substance for Grey Hospital, second most common substance for Invercargill hospital, and eighth equal most common substance for Wellington/Kenepuru hospitals.

A number of ethanol poisonings for persons aged less than 18 years (the legal drinking age in New Zealand) were recorded; 134 for Auckland City Hospital (8.2% of ethanol notifications), three for Wellington/Kenepuru Hospitals (15.0% of ethanol notifications), one for Invercargill Hospital (7.7% of ethanol notifications). None of the Grey Hospital notifications were for persons aged less than 18 years.

Approximately two-thirds (66.5%, 1082/1627) of the Auckland City Hospital ethanol notifications were male (where sex was known). For the remaining hospitals the majority of ethanol notifications were female (Wellington Hospitals: 15/20; Grey Hospital: 3/3 and Invercargill Hospital: 11/13).

4.8.4. Injuries Involving HSNO Substances

Summary data on HSNO substance notifications from CSO and PHUs are presented in Appendix 1 Table 21 and Table 22. A hazardous substance was the primary substance identified in 35 deaths during 2007, the majority being carbon monoxide (77.1%, 27), followed by petrol (11.4%, 4), butane (5.7%, 2), cyanide (2.9%, 1) and toluene (2.9%, 1). The majority of deaths (85.7%, 30) were the result of intentional exposure and were males (74.3%, 26). The highest age-specific HSNO substance mortality rate was for the 25-44 years age group (1.2 per 100 000 population, 14), closely followed by the 45-64 years age group (1.1 per 100 000 population, 11). Where ethnicity was known (33), the majority of HSNO substance deaths were for Europeans (78.8%, 26), followed by Maori (21.2%, 7). Maori had a slightly higher mortality rate (1.2 per 100 000 population) than Europeans (1.0 per 100 000 population).

Combined 2007 PHU data identified 158 PHU notifications involving 46 substances covered by the HSNO Act. The most common HSNO substance reported to PHUs was methylated spirits (15.8%, 25), followed by carbon monoxide (13.3%, 21), methanol (13.3%, 21) and hydrocarbons (12.7%, 20). 14 (8.9%) notifications were the result of poisoning by household cleaners (including disinfectant, toilet bowl cleaner, oven cleaner and dishwashing tablet). A number of other household and industrial HSNO substances were involved in injuries including hypochlorites (7.6%, 12), sodium hypochlorite (2.5%, 4) and solvents (1.9%, 3). The majority of PHU notifications (74.1%, 117) were the result of intentional exposure and were males (where ethnicity known) (58.0%, 91/157). The highest age-specific HSNO substance PHU rate was for the 15-24 years age group (6.0 per 100 000 population, 34), closely followed by the 25-44 years age group (5.9 per 100 000 population, 67). Where ethnicity was known (138), the majority were Europeans (59.4%, 82), followed by Asians (18.1%, 25). The highest ethnicity-specific rate was for Asians (7.3 per 100 000 population), followed by Pacific Peoples (4.4 per 100 000 population, 10).

5. CORONIAL SERVICE OFFICE DATA FOR 2005 AND 2006

Overview

Summary data on CSO deaths for 2005 and 2006 are presented in Appendix 1, Table 24 to Table 27. As of 31 December 2007, the number of deaths attributable to chemical injuries in New Zealand for 2005 and 2006 was 227 (5.6 per 100 000 population) and 177 (4.4 per 100 000 population) respectively. The number of deaths attributable to chemical injuries for 2005 and 2006 is generally less than that observed for the years 2001 to 2004 (240, 246, 237 and 216 respectively); this is not surprising due to timeliness issues discussed previously. It is estimated that the 2005/2006 data are 90% complete.

Intent

Figure 7 illustrates the percentage of chemical injury deaths by intent for 2005 and 2006. The graph shows that for both years, the majority of chemical injury deaths were deemed intentional (64.3%, 146 deaths for 2005; and 63.8%, 113 deaths for 2006), however, a number of deaths were of unknown intent (18.9%, 43 deaths for 2005; and 18.1%, 32 deaths for 2006).

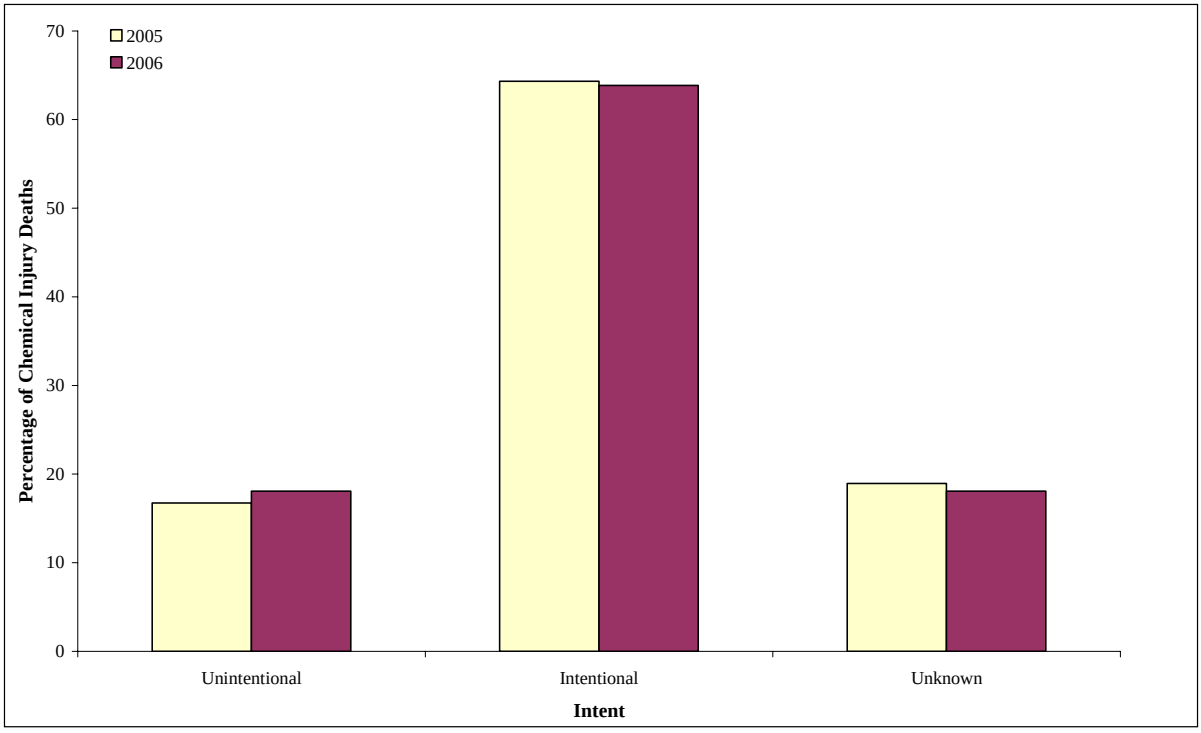

Figure 7: Percentage of Chemical Injury Deaths by Intent, 2005 and 2006

DHB

Figure 8 and Figure 9 illustrate chemical injury mortality data by DHB for both 2005 and 2006. In 2005, the greatest number of deaths occurred in Canterbury DHB (23), closely followed by Waitemata and Counties Manukau DHBs (both reporting 22 deaths). Whanganui DHB had the highest rate (12.9 per 100 000 population, 8), followed by MidCentral DHB (11.3 per 100 000 population, 18). In 2006, Canterbury DHB had the highest number of

reported deaths (29), well ahead of the DHBs with the next greatest number of reported deaths (Waitemata and Auckland DHBs, 19 each). West Coast DHB had the highest rate (9.6 per 100 000 population, 3), followed by MidCentral DHB (7.6 per 100 000 population, 12). It is important to note however, these rates are often based on a low number of reported deaths and there is a large difference for DHBs in terms in the number of deaths reported between 2005 and 2006. For example, Whanganui DHB had the highest rate in 2005 based on 8 deaths; in 2006 only 1 death was reported. This illustrates the variability of the data due to small numbers.

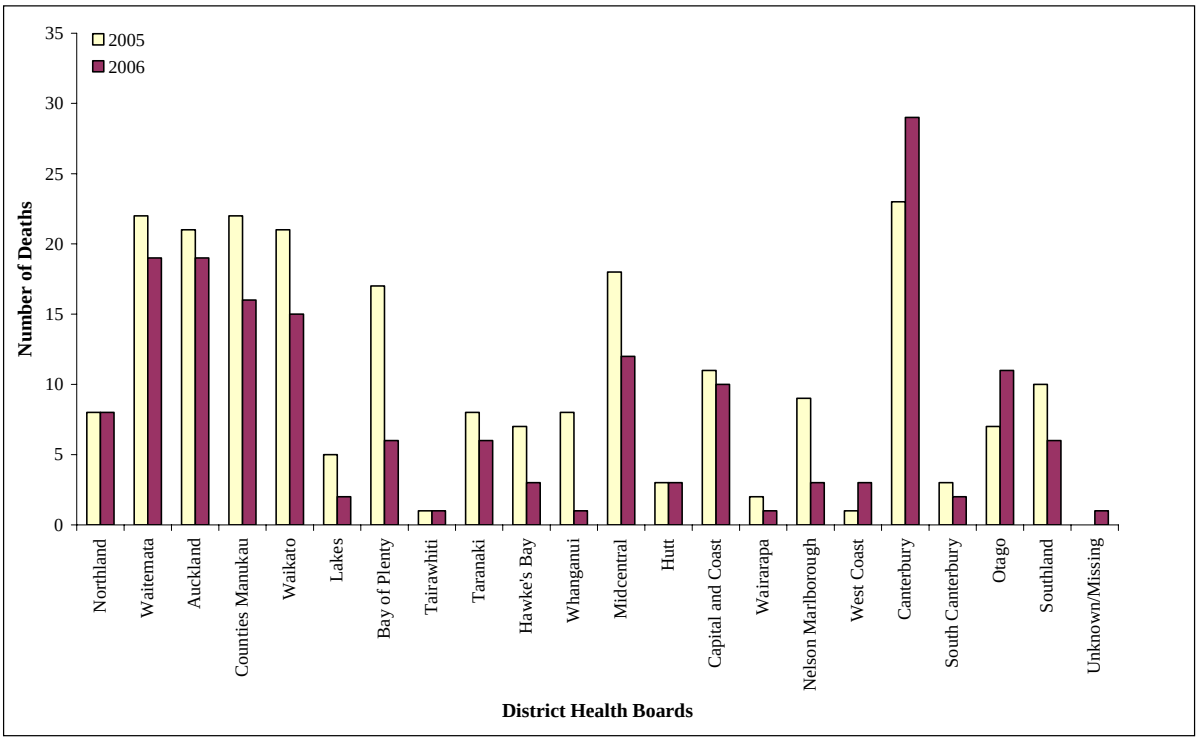

Figure 8: Number of Chemical Injury Deaths by DHB, 2005 and 2006

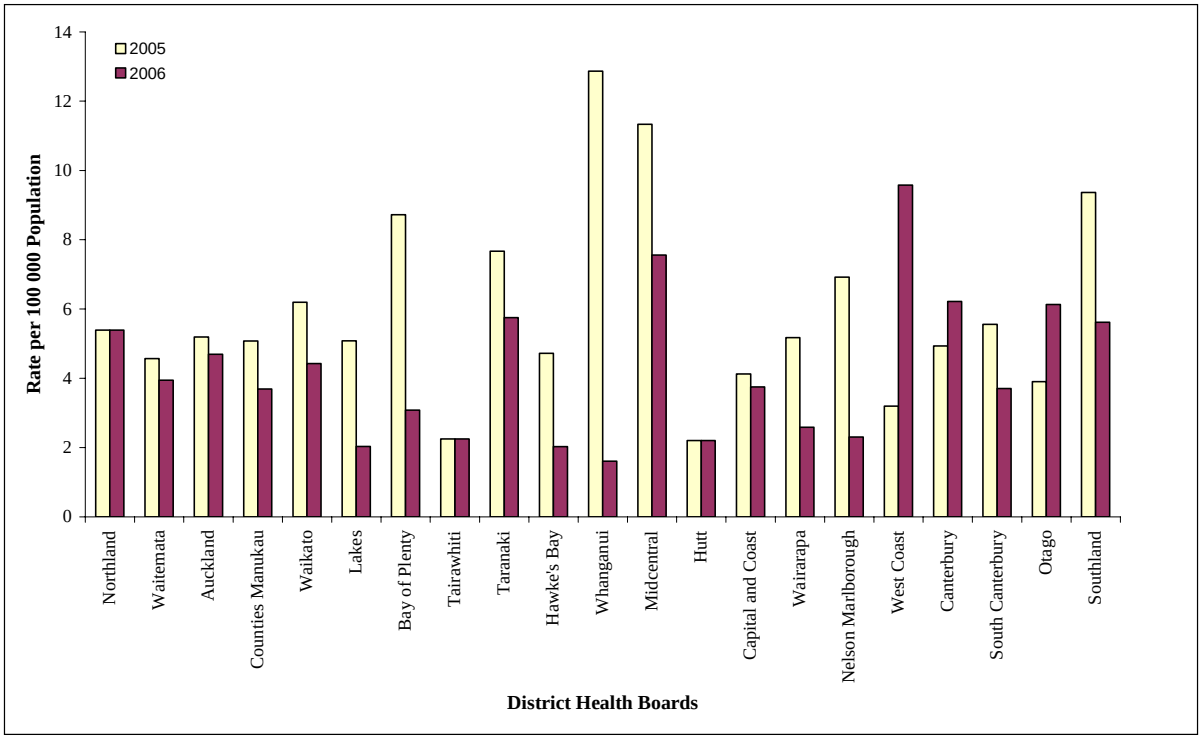

Figure 9: Chemical Injury Mortality Rate by DHB, 2005 and 2006

In 2005, Waitemata DHB had the greatest number of intentional deaths (19), followed by Counties Manukau, Waikato and MidCentral DHBs (15 each). The number of intentional deaths from these four DHBs represented 43.8% (64/146) of the total number of intentional deaths for 2005. In 2005, 15 DHBs had 50.0% or more of the total deaths attributable to intentional exposure. Waitemata DHB had the greatest number of intentional deaths in 2006 (15), followed by Counties Manukau and Canterbury DHBs (12 each) and Waikato DHB (10). The number of intentional deaths from these four DHBs represented 43.4% (49/113) of the total number of intentional deaths for 2006. In 2006, 17 DHBs had 50.0% or more of the total deaths attributable to intentional exposure.

Age

In 2005, the highest age-specific mortality rate occurred in the 25-44 years age group (9.3 per 100 000 population, 105), however, in 2006, the highest age-specific mortality rate occurred in the 45-64 years age group (6.7 per 100 000 population, 64) marginally ahead of the 25-44 years age group (6.5 per 100 000 population, 74). For both years, the lowest age-specific rate (excluding the 0-4 years age group where no deaths were recorded) was for the 5-14 years age group (2005: 0.3 per 100 000 population, 2; and 2006: 0.2 per 100 000 population, 1) (note these rates are based on small numbers) (Figure 10).

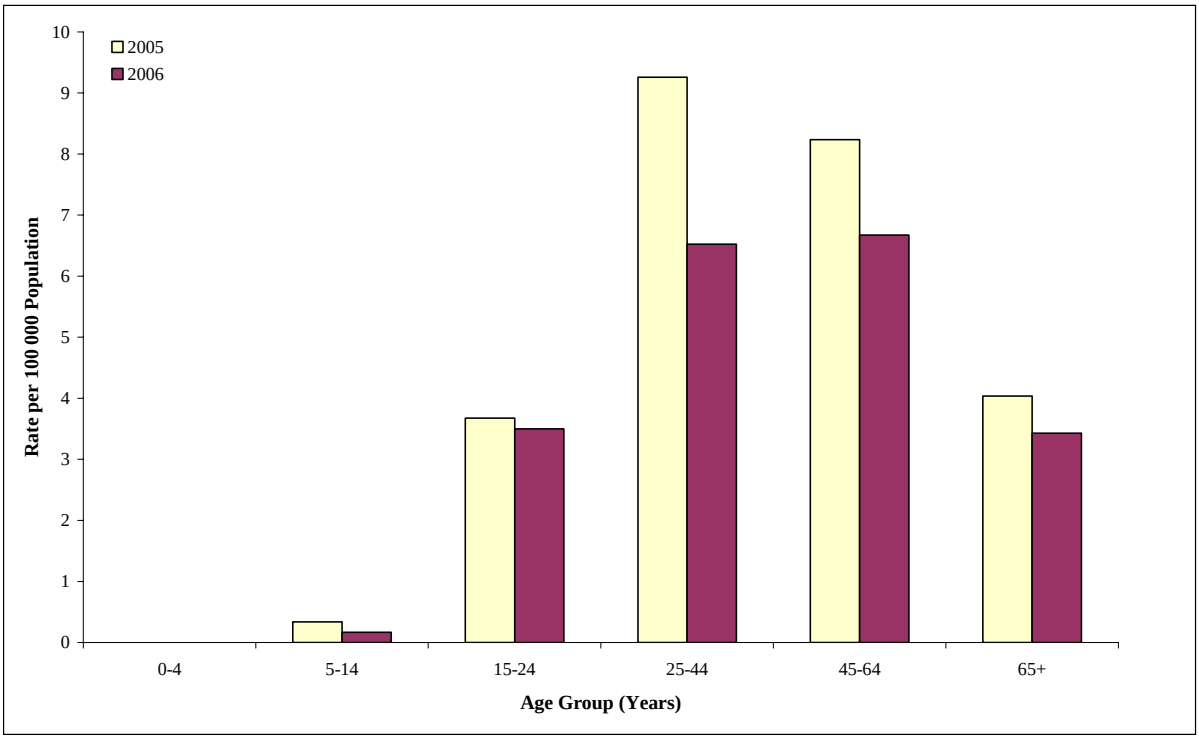

Figure 10: Age-Specific Mortality Rates, 2005 and 2006

The number of intentional chemical injury deaths was highest for the 25-44 years age group (68 in 2005 and 44 in 2006); however, the proportion of intentional deaths versus unintentional/unknown intent deaths for each age group generally increases with increasing age (Figure 11 and Figure 12). For example, in 2006 60.0% (12/20) of the deaths for the 15-24 years age group were intentional, this compares with 82.4% (14/17) for those aged 65 years and over.

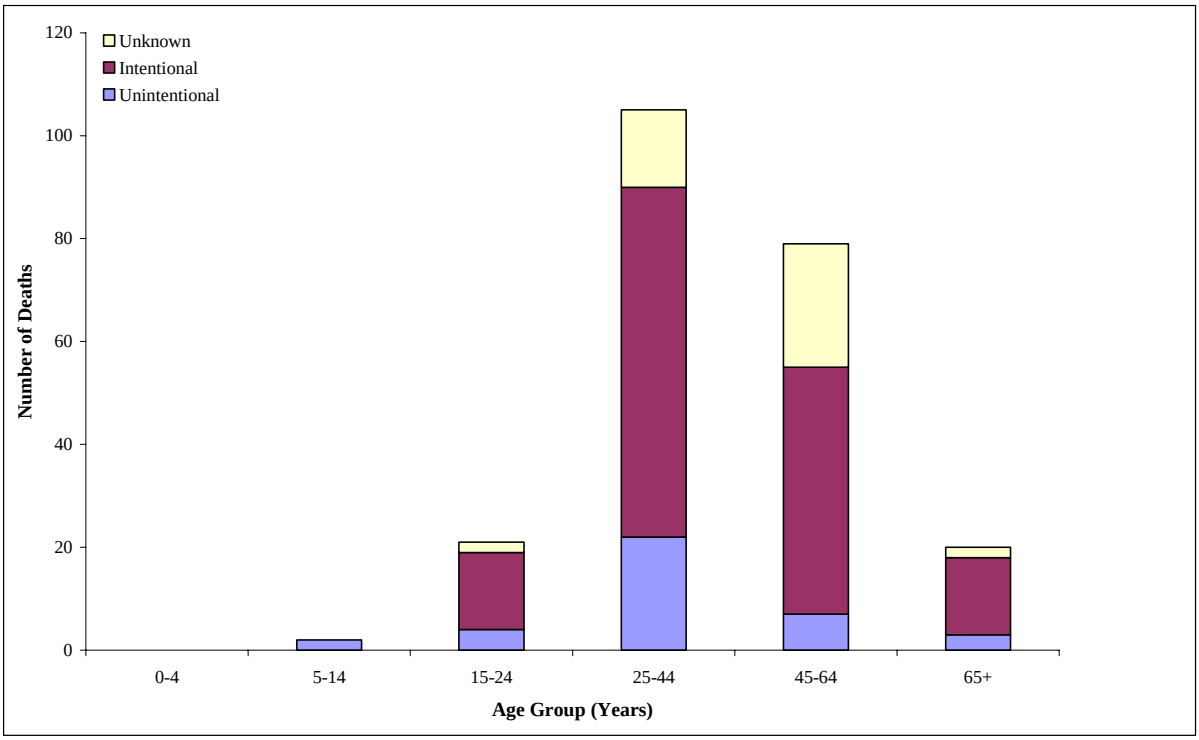

Figure 11: Number of Chemical Injury Deaths by Age Group and Intent, 2005

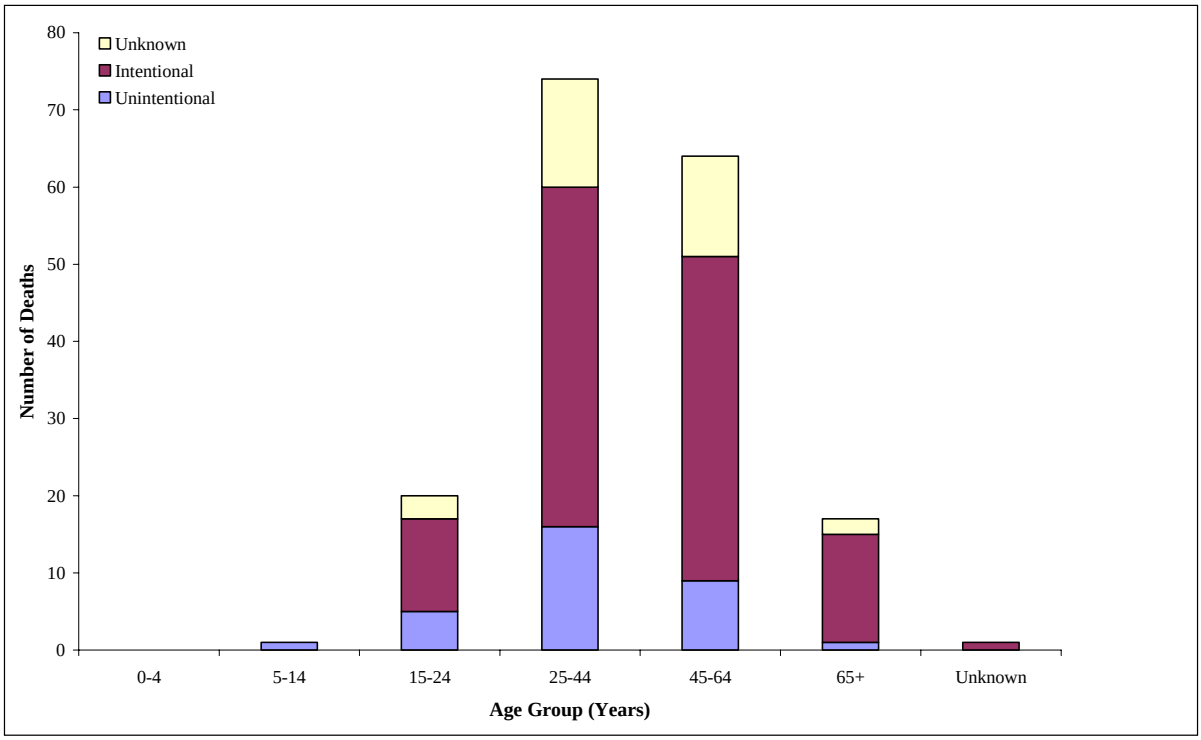

Figure 12: Number of Chemical Injury Deaths by Age Group and Intent, 2006

Sex

For both 2005 and 2006 the majority of chemical injury deaths were for males. In 2005, 74.0% (168/227) of the deaths were male, in 2006, 70.1% (124/177) were male. This equates to 2.8 male deaths for every female death (168 versus 59) in 2005, and 2.3 male deaths for every female death (124 versus 53) in 2006.

Ethnicity

Where ethnicity was known (215), the majority of chemical injury deaths for 2005 were for Europeans (80.5%, 173), followed by Maori (14.4%, 31). The same pattern was evident for 2006 (Europeans: 87.1%, 149/171; Maori: 9.4%, 16/171). Europeans also had the highest ethnicity-specific mortality rate (2005: 6.4 per 100 000 population; 2006: 5.5 per 100 000 population).

Substance

Substance data were similar for 2005 and 2006. For both years combined, 50.5% (204/404) of the deaths involved more than one substance. Combined results show that just under half (48.1%, 189/393) of the substances primarily identified in the deaths (where substance class could be assigned) were classed as household/domestic chemicals. This was followed by therapeutics (29.8%, 117) and chemicals/drugs of abuse (20.6%, 81).

The substance that accounts for the majority of household/domestic chemicals substance class was carbon monoxide. Carbon monoxide was the primary substance identified in 44.6%

(180/404) of deaths for 2005 and 2006 combined. In particular, it was attributed to 67.6% (175/259) of the intentional deaths. Other primary substances which accounted for a notable proportion of the deaths for 2005 and 2006 combined were methadone (6.2%, 25), ethanol (5.9%, 24), morphine or heroin (5.4%, 22) and hydrocarbons (for example butane and petrol) (4.7%, 19). The leading substances involved in the unintentional deaths were methadone (22.9%, 16/70), morphine or heroin (17.1%, 12), ethanol (11.4%, 8), and hydrocarbons (11.4%, 8). Figure 13 shows the top five primary substances identified by intent for the 2005 and 2006 deaths combined. Of interest is that if the individual antidepressants are amalgamated they account for 9.2% (37/404) of chemical injury deaths for 2005 and 2006 combined.

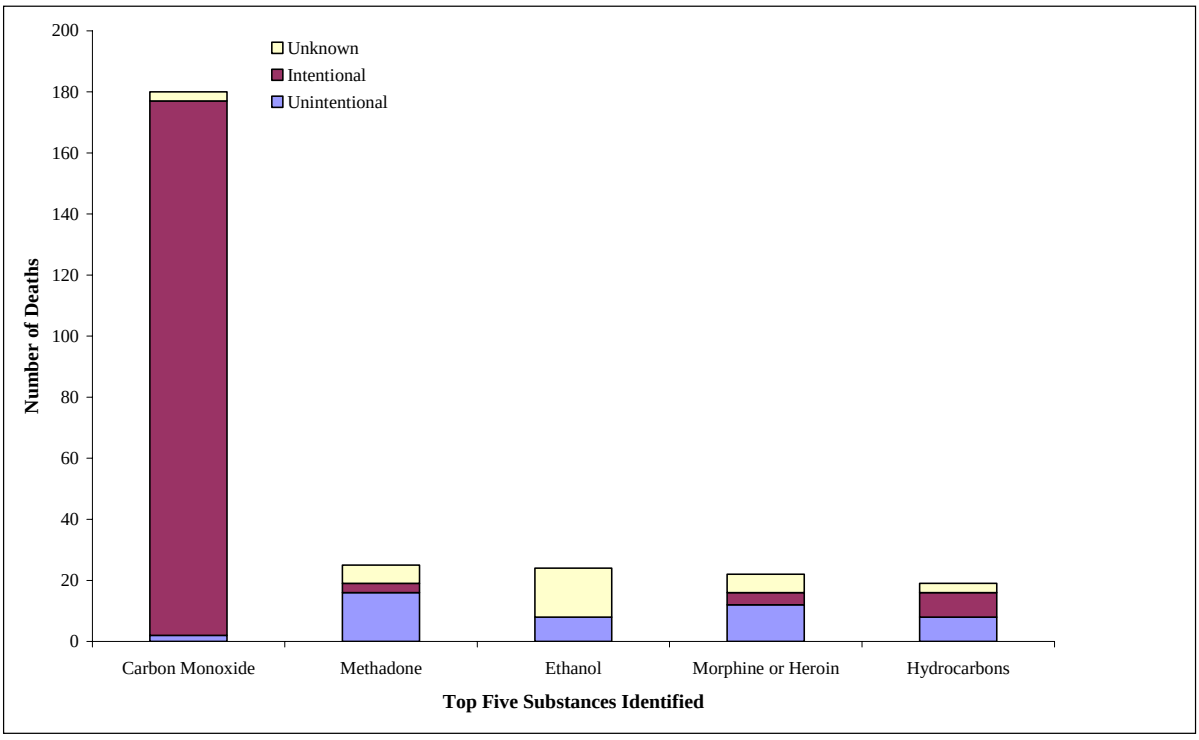

Figure 13: Top Five Primary Substances Identified in Deaths, 2005 and 2006 combined

Primary substances identified for the deaths for these two years which are specifically regulated by the HSNO Act included carbon monoxide (180), hydrocarbons (19), cyanide (2), diquat (1), glyphosate (1), paraquat (1), methylated spirits (1) and caustic soda (1). Where two or more deaths occurred due to a hazardous substance (201) (Table 28) the majority were intentional (91.5%, 184), male (78.6%, 158), and in the 25-44 years age group (41.8%, 84).

6. CONCLUSIONS

This report has presented comprehensive chemical injury surveillance data for the year 2007. The data comprise of national mortality data (sourced from the CSO), national inpatient hospitalisation data (sourced from NZHIS), national spraydrift data (sourced from the DriftNet surveillance system), national poison/chemical notifiable diseases (sourced from EpiSurv), national poison call data (sourced from the NPC), national accident claim data (sourced from ACC), national media analysis and local emergency department data for Auckland City Hospital (Auckland DHB), Wellington and Kenepuru Hospitals (Capital and Coast DHB), Grey Hospital (West Coast DHB) and Invercargill Hospital (Southland DHB). A summary of key statistics for 2007 are detailed in Section 4.2.

In 2004, a comprehensive assemblage of chemical injury data was first presented. National trends across datasets for 2003 and comparison of New Zealand's mortality figures with international results for 2001/2002 were included in the 2003 Annual Report (McDowell *et al.*, 2004), and the latter also published in the New Zealand Medical Journal in 2005 (McDowell *et al.*, 2005). Updated comparisons are not included in this report but trend analysis will be included in the next CISS Annual Report. This years report contains one years worth of local PHU notification data (2007) for all four DHBs (however, it is possible to compare this to at least three years previous worth of PHU data) and two years worth of national CSO data (detailed 2005 and 2006 analysis). In the 2006 report, analysis was also undertaken using local Wairarapa DHB emergency department data (these data were not available for 2007) and in the 2005 report, analysis was also undertaken using local Hutt DHB emergency department data (these data were not available for 2006 or 2007).

As mentioned in Section 3 data from other PHUs/hospitals would be readily and appreciatively encompassed into CISS. While it has been recognised that the most desirable means of capturing any notification is via integration with patient management systems, resources are currently unavailable to enable this.

This Annual Report is the second year that national chemical/poison related notifiable diseases sourced from EpiSurv were included in the CISS and the first year that hazardous substances injury data via EpiSurv were included. It is the intention to continue to incorporate this to capture all available chemical/hazardous substances injury data sources.

The 2007 Annual Report is the first time that a more detailed analysis of NPC human exposure calls were incorporated in the CISS. In the past only summarised NPC data was available and it was not possible to analyse further. It is the intention to continue to incorporate this in the CISS in the future.

DriftNet data have again been included in this report. The number of complaints reported by PHUs for 2007 was only eight, and the number of complaints reported through DriftNet since its implementation in 1998 averages 11 per year for the whole country. It is apparent that the amount of data currently being collected using DriftNet is an under representation of the overall number of events. While we know that the total number of complaints generated by the public is much larger that that, only incidents with health impacts fall under the scope of DriftNet. According to a report by Mazzoni (Mazzoni, 2001) there are significant numbers of incidents *with health effects* being reported to councils and *not passed* on to PHUs:
"…two regional councils forwarded their datasets containing their spray drift incidents over the past two years. Preliminary analysis of both datasets indicates that indeed the reported

incidents are much higher than what is being captured on *Driftnet* (over 200 cases total). In both datasets, a number of the spray drift incidents report human exposures and health complaints. The regional council data however lack the amount of detail and follow up that *Driftnet* would provide. A comprehensive health impact analysis from these regional council datasets is therefore not possible. This clearly indicates the need for the two agencies (PHSs and Regional Councils) to coordinate their efforts in the health sector. Incidentally one of the datasets containing over sixty complaints, some of which indicate human health concerns came from a regional council whose PHS had reported no health spray drift complaints in *Driftnet* for either year".

It has been suggested previously (McDowell, 2004) that the low number of reported complaints on DriftNet may be due to: 1) unfamiliarity with the software and/or software incompatibility and 2) complaints being directed to the NPC or regional councils rather than PHUs. The regional council's aspect has been discussed above, and it appears the bulk of complaints are being directed there rather than the PHUs or NPC (the NPC only received 29 spraydrift calls in 2002). In additions, as ESR is currently accepting the DriftNet data in any form from PHUs and no longer requiring the use of DriftNet software program per se, the software itself is not a likely reason for the low number of complaints. Therefore future discussion between PHUs and regional councils may improve the referral of spraydrift incidents with health impacts to PHUs.

The 2007 Annual Report is the first time that national accident claim data from ACC and a national media analysis has been incorporated. Although it is not possible to capture all ACC claims relating to hazardous and chemical injuries or all media articles, the inclusion of this data adds another element to the comprehensive CISS. It is the intention to include these data sources in future Annual Reports.

An expanded and more detailed HSNO substance injuries analysis has been included in the 2007 Annual Report. Analysis of hazardous substances injury by demographics provides more useful information and is consistent with other similar analyses in this report.

During 2007 the list of NZHIS hospitalisation ICD-10 external cause codes, which are incorporated in the CISS, was reviewed and have been expanded. The current codes are more comprehensive of the range of chemical and hazardous substances injuries that occur and will provide a more accurate depiction of the occurrence of such injuries in New Zealand. The expanded list will therefore be capturing more injuries and for this reason, the numbers in 2007 should not be directly compared to the numbers reported in the 2006 CISS Annual Report.

The small number of cases involved with some of the datasets presented in this report, particularly the CSO data, requires caution when interpreting figures, especially rates. A further limitation of the data presented in this report is the incomplete nature of the CSO data for 2007. As the timing of the reports filed at the CSO can vary by coroner, comparisons across DHBs must be done with care. While intent is most reliable for deaths (determined by the coroner), intent associated with PHU notifications is less robust. For the West Coast and Southland notification data presented in this report, which did not have intent specifically assigned, cases reported as overdoses have been classed as intentional, with any other, for example ingestion or inhalation, have been classed as unintentional.

REFERENCES

Bates, B., & Fowles, J. (2000). *Proposal for the Development of a National Surveillance System for Injuries Caused by Hazardous Substances. ESR Report to the Ministry of Health. Unpublished Report.*

Environmental Risk Management Authority New Zealand. (2008). What is a Hazardous Substance? Retrieved 12 June, 2008, from http://www.ermanz.govt.nz/hs/abouths/index.html

Espitia-Hardeman, V., & Paulozzi, L. (2005). *Injury Surveillance Training Manual*. Atlanta: Centers for Disease Control and Prevention, National Center for Injury Prevention and Control.

Fowles, J. (2001). *The Notification of Injuries from Hazardous Substances: Draft Guidelines and Reference Material for Public Health Services. ESR Report to Ministry of Health. Unpublished Report*.

Fowles, J., Phillips, D., McDowell, R., Gilmore, K., De Feijter, J., & Boyle, K. (2002). *A Chemical Injuries Surveillance System for New Zealand: Report of a Pilot Study. ESR Report to the Ministry of Health. Unpublished Report.*

Institute of Environmental Science and Research. (2008). *Notifiable and Other Diseases in New Zealand Annual Report 2007*. Wellington: Institute of Environmental Science and Research.

Marshall, J., & Woulfe, C. (2007, 6 May). Suspected P lab blows up. *New Zealand Herald*.

Mazzoni, S. (2001). *Report on Agrichemical Spray Drift Incidents Reported to Public Health Services, 2000. ESR Report to the Ministry of Health. Unpublished Report.*

McDowell, R., Fowles, J., & Phillips, D. (2003). *A Comprehensive Chemical Injury Surveillance System for New Zealand: Outcome of a pilot study and proposal for national implementation. ESR report to the Ministry of Health. Unpublished Report.*

McDowell, R. (2004). *Report on Agrichemical Spray Drift Incidents Reported to Public Health Services, 2003. ESR Report to the Ministry of Health. Unpublished Report.*

McDowell, R., Fowles, J., & Phillips, D. (2004). *Chemical Injury Surveillance for New Zealand, 2003: National Implementation and Key Statistics . ESR Report to the Ministry of Health. Unpublished Report.*

McDowell, R., Fowles, J., & Phillips, D. (2005). Deaths from Poisoning in New Zealand 2001-2002. *New Zealand Medical Journal, 118*(1225).

McDowell, R., & Gallagher, L. (2005). *Chemical Injury Surveillance for New Zealand, 2004. ESR Report to the Ministry of Health. Unpublished Report.*

McDowell, R. (2006). *National Notification, Investigation and Surveillance Systems for Chemical Exposures, Bi-Annual Report. ESR Report to the Ministry of Health. Unpublished Report.*

Ministry of Health. (2007). *Direct Laboratory Notification of Communicable Diseases: National Guidelines*. Wellington: Ministry of Health.

Moss, T. (2007, 11 June). River diners gassed. *The Marlborough Express*.

NZ Herald Staff, & NZPA. (2007). Man burned in P-lab explosion dies [Electronic Version]. *New Zealand Herald*. Retrieved 9 May from http://www.nzherald.co.nz/section/1/story.cfm?c_id=1&objectid=10438672.

NZPA. (2007a). Flaming cocktail offender offered work as bartender [Electronic Version]. Retrieved 30 November from http://www.stuff.co.nz/4298894a12855.html.

NZPA. (2007b). Playground matting lifted after acid burns baby [Electronic Version]. Retrieved 29 November from http://www.stuff.co.nz/4297063a10.html.

NZPA. (2007c). Otago explorer 'minutes from death' - rescuer [Electronic Version]. Retrieved 17 December from http://www.stuff.co.nz/4327108a10.html.

One News. (2007). Drug-laced beads banished [Electronic Version] from http://tvnz.co.nz/view/tvnz_portable_story_skin/1433005.

Shieffelbien, L. (2007, 20 September). Personal Communication.

Tisch, C., & Slaney, D. (2007). *Chemical Injury Surveillance for New Zealand, 2006*. Wellington: Institute of Environmental Science and Research.

Watt, E., & NZPA. (2007). Ohope chemical house siege over [Electronic Version]. Retrieved 9 October from http://www.stuff.co.nz/4231263a11.html.

APPENDIX 1

Table 6: National Chemical Injury Data from CSO, NZHIS, PHU and DriftNet by DHB, 2007

DHB	CSO Deaths to Date[1]		NZHIS Admitted Patients		PHU Notifications		DriftNet Complaints
	No.	Rate[2]	No.	Rate[2]	No.	Rate[2]	No.
Northland	6	4.0	327	220.3			0
Waitemata	7	1.5	1228	255.0			1
Auckland	7	1.7	936	231.3	2624	648.5	1
Counties Manukau	8	1.8	970	224.0			0
Waikato	6	1.8	456	134.4			1
Lakes	2	2.0	229	232.8			0
Bay of Plenty	5	2.6	404	207.3			2
Tairawhiti	0	0.0	82	184.5			0
Taranaki	2	1.9	140	134.2			0
Hawke's Bay	2	1.3	232	156.5			2
Whanganui	3	4.8	164	263.7			0
Midcentral	7	4.4	404	254.3			0
Hutt	2	1.5	197	144.7			0
Capital and Coast	8	3.0	275	103.1	576	216.0	0
Wairarapa	0	0.0	102	263.9			1
Nelson Marlborough	4	3.1	301	231.4			0
West Coast	0	0.0	87	277.6	15	47.9	0
Canterbury	3	0.6	1190	255.1			0
South Canterbury	0	0.0	107	198.3			0
Otago	6	3.3	460	256.4			0
Southland	2	1.9	255	238.7	118	110.5	0
Area Outside DHB			60				
National	**80**	**2.0**	**8606**	**213.6**			**8**

[1] Deaths to date as of 31 December 2007. Overall, estimated to be 50-60% complete. Completion rates may vary by DHB.

[2] Rate calculated using 2006 Census data and expressed as per 100 000 population. Caution advised when interpreting rates based on counts less than ten.

Table 7: National Chemical Injury Demographic Data from CSO and NZHIS, 2007

Demographics		CSO (Deaths to Date)[1]			NZHIS (Admitted Patients)		
		No.	Rate[2]	%[3]	No.	Rate[2]	%[3]
Intent	Intentional	45	1.1	56.3	4329	107.5	50.3
	Unintentional	12	0.3	15.0	2771	68.8	32.2
	Assault				20	0.5	0.2
	Legal				1	0.0	0.0
	Indeterminate or Unknown Intent	23	0.6	28.8	1485	36.9	17.3
Age Group	0-4	0	0.0	0.0	825	299.9	9.6
	5-14	1	0.2	1.3	420	70.9	4.9
	15-24	8	1.4	10.0	2115	370.3	24.6
	25-44	29	2.6	36.3	2881	254.0	33.5
	45-64	34	3.5	42.5	1645	171.5	19.1
	65+	8	1.6	10.0	720	145.3	8.4
Sex	Female	29	1.4	36.3	5128	248.7	59.6
	Male	51	2.6	63.8	3478	176.9	40.4
Ethnicity	European	59	2.2	77.6	6086	225.9	71.7
	Maori	15	2.7	19.7	1386	245.2	16.3
	Pacific Peoples	0	0.0	0.0	364	160.9	4.3
	Asian	2	0.6	2.6	398	116.8	4.7
	Other	0		0.0	253		3.0
	Unknown	4			119		
National		**80**	**2.0**		**8606**	**213.6**	

[1] Deaths to date as of 31 December 2007. Overall, estimated to be 50-60% complete. Completion rates may vary by DHB.

[2] Rate calculated using 2006 Census data and expressed per 100 000 population. Caution advised when interpreting rates based on counts less than ten.

[3] Proportion (%) of total cases (for respective data source) where demographic (age group/sex/ethnicity) was known.

Table 8: Auckland DHB Chemical Injury Demographic Data from CSO, NZHIS, and PHU, 2007

Demographics		CSO (Deaths to Date)[1]			NZHIS (Admitted Patients)			PHU Notifications		
		No	Rate	%[3]	No.	Rate[2]	%[3]	No.	Rate[2]	%[3]
Intent	Intentional	2	0.5	28.6	481	118.9	51.4	1222	302.0	46.6
	Unintentional	1	0.2	14.3	354	87.5	37.8	769	190.1	29.3
	Assault				1	0.2	0.1			
	Legal				0	0.0	0.0			
	Indeterminate or Unknown Intent	4	1.0	57.1	100	24.7	10.7	633	156.5	24.1
Age Group	0-4	0	0.0	0.0	86	330.1	9.2	1	3.8	0.0
	5-14	0	0.0	0.0	37	74.0	4.0	3	6.0	0.1
	15-24	0	0.0	0.0	229	340.6	24.5	1082	1609.2	41.2
	25-44	2	1.5	28.6	322	236.5	34.4	1005	738.0	38.3
	45-64	5	5.8	71.4	183	212.0	19.6	440	509.7	16.8
	65+	0	0.0	0.0	79	203.7	8.4	93	239.8	3.5
Sex	Female	2	1.0	28.6	540	260.4	57.7	1154	556.5	44.1
	Male	5	2.5	71.4	396	200.8	42.3	1460	740.3	55.9
	Unknown	0			0			10		
Ethnicity	European	3	1.4	50.0	576	275.8	62.7	1642	786.1	66.1
	Maori	2	6.7	33.3	114	382.0	12.4	312	1045.5	12.6
	Pacific Peoples	0	0.0	0.0	80	175.6	8.7	234	513.7	9.4
	Asian	1	1.1	16.7	109	119.0	11.9	252	275.2	10.1
	Other	0		0.0	40		4.4	45		1.8
	Unknown	1			17			139		
Overall		**7**	**1.7**		**936**	**231.3**		**2624**	**648.5**	

[1] Deaths to date as of 31 December 2007. Overall, estimated to be 50-60% complete. Completion rates may vary by DHB.

[2] Rate calculated using 2006 Census data and expressed per 100 000 population. Caution advised when interpreting rates based on counts less than ten.

[3] Proportion (%) of total cases (for respective data source) where demographic (age group/sex/ethnicity) was known.

Table 9: Capital and Coast DHB Chemical Injury Demographic Data from CSO, NZHIS, and PHU, 2007

Demographics		CSO (Deaths to Date)[1]			NZHIS (Admitted Patients)			PHU Notifications		
		No.	Rat	%[3]	No.	Rate[2]	%[3]	No.	Rate[2]	%[3]
Intent	Intentional	2	0.8	25.0	173	64.9	62.9	408	153.0	70.8
	Unintentional	1	0.4	12.5	61	22.9	22.2	154	57.8	26.7
	Assault				0	0.0	0.0			
	Legal				0	0.0	0.0			
	Indeterminate or Unknown Intent	5	1.9	62.5	41	15.4	14.9	14	5.3	2.4
Age Group	0-4	0	0.0	0.0	11	62.8	4.0	45	256.9	7.8
	5-14	0	0.0	0.0	8	23.3	2.9	9	26.2	1.6
	15-24	0	0.0	0.0	73	172.3	26.5	204	481.5	35.4
	25-44	2	2.3	25.0	107	125.4	38.9	198	232.1	34.4
	45-64	5	8.5	62.5	54	91.6	19.6	90	152.6	15.6
	65+	1	3.6	12.5	22	78.3	8.0	30	106.7	5.2
Sex	Female	3	2.2	37.5	177	128.1	64.4	390	282.3	67.7
	Male	5	3.9	62.5	98	76.3	35.6	186	144.7	32.3
Ethnicity	European	8	4.4	100.0	191	104.7	71.8	422	231.3	75.4
	Maori	0	0.0	0.0	33	124.5	12.4	62	234.0	11.1
	Pacific Peoples	0	0.0	0.0	17	89.4	6.4	28	147.3	5.0
	Asian	0	0.0	0.0	17	68.7	6.4	28	113.2	5.0
	Other	0		0.0	8		3.0	20		3.6
	Unknown	0			9			16		
Overall		**8**	**3.0**		**275**	**103.1**		**576**	**216.0**	

[1] Deaths to date as of 31 December 2007. Overall, estimated to be 50-60% complete. Completion rates may vary by DHB.

[2] Rate calculated using 2006 Census data and expressed per 100 000 population. Caution advised when interpreting rates based on counts less than ten.

[3] Proportion (%) of total cases (for respective data source) where demographic (age group/sex/ethnicity) was known.

Table 10: West Coast DHB Chemical Injury Demographic Data from CSO, NZHIS, and PHU, 2007

Demographics		CSO (Deaths to Date)[1]			NZHIS (Admitted Patients)			PHU Notifications		
		No	Rate	%[3]	No.	Rate[2]	%[3]	No.	Rate[2]	%[3]
Intent	Intentional	No deaths reported to date			35	111.7	40.2	9	28.7	60.0
	Unintentional				35	111.7	40.2	6	19.1	40.0
	Assault				0	0.0	0.0			
	Legal				0	0.0	0.0			
	Indeterminate or Unknown Intent				17	54.3	19.5	0	0.0	0.0
Age Group	0-4				6	316.5	6.9	1	52.7	6.7
	5-14				6	133.4	6.9	1	22.2	6.7
	15-24				25	738.3	28.7	6	177.2	40.0
	25-44				23	274.8	26.4	4	47.8	26.7
	45-64				20	226.8	23.0	3	34.0	20.0
	65+				7	160.3	8.0	0	0.0	0.0
Sex	Female				45	291.8	51.7	12	78.1	80.0
	Male				42	264.0	48.3	3	19.0	20.0
Ethnicity	European				78	292.2	92.9	4	15.0	100.0
	Maori				4	137.5	4.8	0	0.0	0.0
	Pacific Peoples				0	0.0	0.0	0	0.0	0.0
	Asian				1	334.4	1.2	0	0.0	0.0
	Other				1		1.2	0		0.0
	Unknown				3			11		
Overall		**0**	**0.0**		**87**	**277.6**		**15**	**47.9**	

[1] Deaths to date as of 31 December 2007. Overall, estimated to be 50-60% complete. Completion rates may vary by DHB.

[2] Rate calculated using 2006 Census data and expressed per 100 000 population. Caution advised when interpreting rates based on counts less than ten.

[3] Proportion (%) of total cases (for respective data source) where demographic (age group/sex/ethnicity) was known.

Table 11: Southland DHB Chemical Injury Demographic Data from CSO, NZHIS, and PHU, 2007

Demographics		CSO (Deaths to Date)[1]			NZHIS (Admitted Patients)			PHU Notifications		
		No.	Rate	%[3]	No.	Rate[2]	%[3]	No.	Rate[2]	%[3]
Intent	Intentional	2	1.9	100.0	78	73.0	30.6	88	82.4	74.6
	Unintentional	0	0.0	0.0	88	82.4	34.5	13	12.2	11.0
	Assault				0	0.0	0.0			
	Legal				0	0.0	0.0			
	Indeterminate or Unknown Intent	0	0.0	0.0	89	83.3	34.9	17	15.9	14.4
Age Group	0-4	0	0.0	0.0	47	680.0	18.4	17	245.9	14.4
	5-14	0	0.0	0.0	14	94.0	5.5	1	6.7	0.8
	15-24	1	7.3	50.0	59	429.5	23.1	37	269.3	31.4
	25-44	0	0.0	0.0	79	253.8	31.0	44	141.3	37.3
	45-64	1	3.8	50.0	39	148.1	15.3	13	49.4	11.0
	65+	0	0.0	0.0	17	123.0	6.7	6	43.4	5.1
Sex	Female	1	1.9	50.0	153	286.1	60.0	72	134.6	61.0
	Male	1	1.9	50.0	102	191.2	40.0	46	86.2	39.0
Ethnicity	European	2	2.3	100.0	212	240.6	84.5	Ethnicity data not collected		
	Maori	0	0.0	0.0	25	220.9	10.0			
	Pacific Peoples	0	0.0	0.0	2	166.4	0.8			
	Asian	0	0.0	0.0	3	154.5	1.2			
	Other	0			9		3.6			
	Unknown	0			4					
Overall		**2**	**1.9**		**255**	**238.7**		**118**	**110.5**	

[1] Deaths to date as of 31 December 2007. Overall, estimated to be 50-60% complete. Completion rates may vary by DHB.

[2] Rate calculated using 2006 Census data and expressed per 100 000 population. Caution advised when interpreting rates based on counts less than ten.

[3] Proportion (%) of total cases (for respective data source) where demographic (age group/sex/ethnicity) was known.

Table 12: National Chemical Injury CSO Data by Primary Substance[1] and NZHIS Data by ICD-10 Code, 2007

CSO (deaths to date)[2]			NZHIS (admitted patients)		
Primary Substance	**No.**	**%[3]**	**Primary ICD-10 External Cause Code (top 11)**	**No.**	**%[3]**
Carbon Monoxide	27	33.8	X61	2153	25.0
Ethanol (chronic)	6	7.5	X60	1138	13.2
Codeine	5	6.3	X44	695	8.1
Ethanol	4	5.0	X49	695	8.1
Petrol	4	5.0	X41	447	5.2
Morphine or Heroin	3	3.8	X64	405	4.7
Dothiepin	3	3.8	Y11	357	4.1
Methadone	3	3.8	X40	341	4.0
Butane	2	2.5	X62	263	3.1
Dihydrocodeine	2	2.5	X42	225	2.6
Zopiclone	2	2.5	X04	172	2.0
Remaining substances (19) only occur once					
Total	**80**		**Total**	**8606**	

1 Primary substance identified as involved in the death.
2 Deaths to date as of 31 December 2007. Overall, estimated to be 50-60% complete. Completion rates may vary by DHB.
3 Refer to Table 1 for description of each code. Primary ICD-10 External Cause Code.
4 Proportion (%) of total substances/ICD-10 codes (for respective data source) where substance/ICD-10 code was known.

Table 13: Auckland DHB Chemical Injury Data from CSO, NZHIS and PHU by Substance[1], 2007

CSO (deaths to date)[2]			NZHIS (admitted patients)			PHU Notifications		
Primary Substance	**No.**	**%[4]**	**Primary ICD-10 Code[3] (top 6)**	**No.**	**%[4]**	**Substance (top 5)**	**No.**	**%[4]**
Ethanol	2	28.6	X61	258	27.6	Ethanol	1634	54.2
Carbon Monoxide	1	14.3	X60	123	13.1	Paracetamol	137	4.5
Codeine	1	14.3	X49	102	10.9	Zopiclone	103	3.4
Toluene	1	14.3	X44	75	8.0	Ibuprofen	50	1.6
Methadone	1	14.3	X41	64	6.8	GHB[5]	48	1.6
Quetiapine	1	14.3	X40	44	4.7			
Total	**7**		**Total**	**936**		**Total**	**3016**	

1 Primary substance identified as involved in the death.
2 Deaths to date as of 31 December 2007. Overall, estimated to be 50-60% complete. Completion rates may vary by DHB.
3 Refer to Table 1 for description of each code. Primary ICD-10 External Cause Code.
4 Proportion (%) of total substances/ICD-10 codes (for respective data source) where substance/ICD-10 code was known.
5 Gamma-hydroxybutyrate

Table 14: Capital and Coast DHB Chemical Injury Data from CSO, NZHIS and PHU by Substance[1], 2007

CSO (deaths to date)[2]			NZHIS (admitted patients)			PHU Notifications		
Primary Substance	**No.**	**%[3]**	**Primary ICD10 Code[3] (top 5)**	**No.**	**%[4]**	**Substance (top 5)**	**No.**	**%[4]**
Ethanol (chronic)	3	37.5	X61	84	30.5	Paracetamol	127	18.4
Morphine or Heroin	2	25.0	X60	54	19.6	Zopiclone	54	7.8
Carbon Monoxide	2	25.0	X44	18	6.5	Clonazepam	33	4.8
Codeine	1	12.5	X64	17	6.2	Quetiapine	30	4.4
			Y11	16	5.8	Ibuprofen	29	4.2
Total	**8**		**Total**	**275**		**Total**	**689**	

[1] Primary substance identified as involved in the death.
[2] Deaths to date as of 31 December 2007. Overall, estimated to be 50-60% complete. Completion rates may vary by DHB.
[3] Refer to Table 1 for description of each code. Primary ICD-10 External Cause Code.
[4] Proportion (%) of total substances/ICD-10 codes (for respective data source) where substance/ICD-10 code was known.

Table 15: West Coast DHB Chemical Injury Data from CSO, NZHIS and PHU by Substance[1], 2007

CSO (deaths to date)[2]			NZHIS (admitted patients)			PHU Notifications		
Primary Substance	**No.**	**%[3]**	**Primary ICD10 Code[3] (top 6)**	**No.**	**%[4]**	**Substance (top 6)**	**No.**	**%[4]**
No deaths reported to date			X61	15	17.2	Codeine	3	9.4
			X60	12	13.8	Ethanol	3	9.4
			X49	10	11.5	Paracetamol	3	9.4
			X44	8	9.2	Sodium Valproate	3	9.4
			X21	5	5.7	Ibuprofen	2	6.3
			X45	5	5.7	Paroxetine	2	6.3
Total	**0**		**Total**	**87**		**Total**	**32**	

[1] Primary substance identified as involved in the death.
[2] Deaths to date as of 31 December 2007. Overall, estimated to be 50-60% complete. Completion rates may vary by DHB.
[3] Refer to Table 1 for description of each code. Primary ICD-10 External Cause Code.
[4] Proportion (%) of total substances/ICD-10 codes (for respective data source) where substance/ICD-10 code was known.

Table 16: Southland DHB Chemical Injury Data from CSO, NZHIS and PHU by Substance[1], 2007

CSO (deaths to date)[2]			NZHIS (admitted patients)			PHU Notifications		
Primary Substance	**No.**	**%[4]**	**Primary ICD10 Code[3] (top 4)**	**No.**	**%[4]**	**Substance (top 5)**	**No.**	**%[4]**
Carbon Monoxide	1	50.0	X61	38	14.9	Paracetamol	27	15.9
Temazepam	1	50.0	Y11	24	9.4	Ethanol	13	7.6
			X44	23	9.0	Citalopram	9	5.3
			X49	22	8.6	Codeine	8	4.7
						Zopiclone	7	4.1
Total	**2**		**Total**	**255**		**Total**	**170**	

[1] Primary substance identified as involved in the death.
[2] Deaths to date as of 31 December 2007. Overall, estimated to be 50-60% complete. Completion rates may vary by DHB.
[3] Refer to Table 1 for description of each code. Primary ICD-10 External Cause Code.
[4] Proportion (%) of total substances/ICD-10 codes (for respective data source) where substance/ICD-10 code was known.

Table 17: Summary Demographic Data for Injuries in Children Aged Less than Five Years, 2007

Demographics		NZHIS National		Wellington Hospitals		Grey Hospital		Invercargill Hospital	
		No.	**%[1]**	**No.**	**%[1]**	**No.**	**%[1]**	**No.**	**%[1]**
Intent	Intentional	0	0.0	0	0.0	0	0.0	6	35.3
	Unintentional	779	94.4	44	97.8	0	0.0	7	41.2
	Indeterminate or Unknown Intent	46	5.6	1	2.2	1	100.0	4	23.5
Sex	Female	364	44.1	21	46.7	1	100.0	4	23.5
	Male	461	55.9	24	53.3	0	0.0	13	76.5
Ethnicity	European	500	60.8	31	68.9	0	0.0	Not collected	
	Maori	200	24.3	5	11.1	0	0.0		
	Pacific Peoples	60	7.3	4	8.9	0	0.0		
	Asian	48	5.8	5	11.1	0	0.0		
	Other	14	1.7	0	0.0	0	0.0		
	Unknown	3		0		1			
Overall	No. of cases and % of total cases	**825**	**9.6**	**45**	**7.8**	**1**	**6.7**	**17**	**14.4**

Note: no injury deaths in children aged less than five years have been reported for 2007 from the CSO as of 31 December 2007. ARPHS data are excluded because notifications from Starship Hospital are not received.
[1] Proportion (%) of total cases where demographic (sex/ethnicity) was known.

Table 18: Substance by PHU for Injuries in Children Aged Less Than Five Years, 2007

Substance (top 9)	Wellington Hospitals	Grey Hospital	Invercargill Hospital	Total	%[1]
Paracetamol	8	0	4	12	19.4
Hydrocarbons	2	0	2	4	6.5
Carbamazepine	2	0	0	2	3.2
Hyoscine butylbromide	2	0	0	2	3.2
Temazepam	2	0	0	2	3.2
Warfarin	0	0	2	2	3.2
Zopiclone	2	0	0	2	3.2

[1] Proportion (%) of total substances involved with injuries in children aged less than five years where substance was known (two injuries involving unknown substances). Total of 64 substance occurrences (45 individual substances).

Table 19: Summary Demographic Data for Paracetamol Poisonings, 2007

Demographics		Auckland City Hospital		Wellington Hospitals		Grey Hospital		Invercargill Hospital	
		No.	**%[1]**	**No.**	**%[1]**	**No.**	**%[1]**	**No.**	**%[1]**
Intent	Intentional	125	91.2	111	87.4	2	66.7	24	88.9
	Unintentional	6	4.4	14	11.0	1	33.3	2	7.4
	Indeterminate or Unknown Intent	6	4.4	2	1.6	0	0.0	1	3.7
Age Group	0-4	0	0.0	8	6.3	0	0.0	4	14.8
	5-14	0	0.0	3	2.4	0	0.0	1	3.7
	15-24	67	48.9	66	52.0	1	33.3	12	44.4
	25-44	47	34.3	29	22.8	1	33.3	8	29.6
	45-64	18	13.1	21	16.5	1	33.3	2	7.4
	65+	5	3.6	0	0.0	0	0.0	0	0.0
Sex	Female	104	75.9	107	84.3	3	100.0	14	51.9
	Male	33	24.1	20	15.7	0	0.0	13	48.1
Ethnicity	European	85	62.0	97	78.9	0	0.0	Not collected	
	Maori	13	9.5	12	9.8	0	0.0		
	Pacific Peoples	14	10.2	6	4.9	0	0.0		
	Asian	23	16.8	6	4.9	0	0.0		
	Other	2	1.5	2	1.6	0	0.0		
	Unknown	0		4		3			
Overall	No. of cases and % of total substances[2]	**137**	**4.5**	**127**	**18.4**	**3**	**9.4**	**27**	**15.9**

Note 1: No paracetamol poisoning deaths have been reported for 2007 from the CSO as of 31 December 2007.
Note 2: Paracetamol combinations such as dextropropoxyphene/paracetamol or paracetamol/codeine not included in paracetamol counts.
[1] Proportion (%) of total cases where demographic (age group/sex/ethnicity) was known.
[2] Where substance was known

Table 20: Summary Demographic Data for Acute Ethanol Poisonings, 2007

Demographics		CSO National[1]		Auckland City Hospital		Wellington Hospitals		Grey Hospital		Invercargill Hospital	
		No.	%[2]	No.	%[2]	No.	%[2]	No.	%[2]	No.	%[2]
Intent	Intentional	0	0.0	362	22.2	13	65.0	2	66.7	9	69.2
	Unintentional	0	0.0	731	44.7	4	20.0	1	33.3	0	0.0
	Indeterminate or Unknown Intent	4	100.0	541	33.1	3	15.0	0	0.0	4	30.8
Age Group	0-4	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	5-14	0	0.0	1	0.1	0	0.0	0	0.0	0	0.0
	15-24	0	0.0	694	42.5	11	55.0	1	33.3	5	38.5
	25-44	0	0.0	618	37.8	4	20.0	1	33.3	6	46.2
	45-64	4	100.0	266	16.3	5	25.0	1	33.3	2	15.4
	65+	0	0.0	55	3.4	0	0.0	0	0.0	0	0.0
Sex	Female	0	0.0	545	33.5	15	75.0	3	100.0	11	84.6
	Male	4	100.0	1082	66.5	5	25.0	0	0.0	2	15.4
	Unknown	0	0.0	7		0	0.0	0	0.0	0	0.0
Ethnicity	European	3	75.0	991	64.8	14	70.0	0	0.0	Not collected	
	Maori	0	0.0	194	12.7	3	15.0	0	0.0		
	Pacific Peoples	0	0.0	168	11.0	0	0.0	0	0.0		
	Asian	1	25.0	146	9.5	2	10.0	0	0.0		
	Other	0	0.0	31	2.0	1	5.0	0	0.0		
	Unknown	0		104		0		3			
Overall	No. of cases and % of total substances[3]	**4**	**5.0**	**1634**	**54.2**	**20**	**2.9**	**3**	**9.4**	**13**	**7.6**

[1] Data as of 31 December 2007. Acute deaths only. In addition there have been six deaths from chronic ethanol exposure reported for 2007.
[2] Proportion (%) of total ethanol poisonings (for respective data source) where demographic was known.
[3] Proportion (%) of total ethanol poisonings (for respective data source) where substance was known.

Table 21: HSNO Substances from Combined PHU Hospital Notification Data, 2007

Frequency[1]	Substances
25	Methylated Spirits
21	Carbon monoxide, methanol
20	Hydrocarbon
14	Household cleaner
12	Hypochlorite
4	Sodium hypochlorite
3	Solvent
2	Chlorine gas, eucalyptus oil, glue, glyphosate, herbicide, methyl ethyl ketone peroxide, paint, rat poison, refrigerant gas
1	Acetic anhydride, acetone, adhesive, brake fluid, butanone, carbon dioxide, chloroform, dichloroisocyanuric acid, dishwash liquid, ethylene glycol, isopropyl alcohol, linseed oil, polyurethane, rat bait, slug pellets, sodium hydroxide, spa cleaner, spray paint, sulphuric acid, weedkiller

[1] Total of 158 notifications involving 46 HSNO substances

Table 22: HSNO Substances Injury Data from CSO and PHU, 2007

Demographics		CSO (Deaths to Date)[1]			PHU Notifications		
		No.	Rate[2]	%[3]	No.	Rate[2]	%[3]
Intent	Intentional	30	0.7	85.7	117	2.9	74.1
	Unintentional	2	0.0	5.7	27	0.7	17.1
	Indeterminate or Unknown Intent	3	0.1	8.6	14	0.3	8.9
Age Group	0-4	0	0.0	0.0	10	3.6	6.3
	5-14	1	0.2	2.9	1	0.2	0.6
	15-24	4	0.7	11.4	34	6.0	21.5
	25-44	14	1.2	40.0	67	5.9	42.4
	45-64	11	1.1	31.4	38	4.0	24.1
	65+	5	1.0	14.3	8	1.6	5.1
Sex	Female	9	0.4	25.7	66	3.2	42.0
	Male	26	1.3	74.3	91	4.6	58.0
	Unknown	0			1		
Ethnicity	European	26	1.0	78.8	82	3.0	59.4
	Maori	7	1.2	21.2	16	2.8	11.6
	Pacific Peoples	0	0.0	0.0	10	4.4	7.2
	Asian	0	0.0	0.0	25	7.3	18.1
	Other	0		0.0	5		3.6
	Unknown	2			20		
Overall		**35**	**0.9**		**158**	**3.9**	

[1] Primary substance identified as involved in the death.

Table 23: Injury Claim Data from ACC, 2007

Demographics		ICD10 Primary Diagnosis Codes							
		J61	J68[1]	L2[2]	T3[3]	T5[4]	T70.3	T96	T97
Sex	Female	0	6	3	126	115	3	3	0
	Male	0	10	6	102	155	26	3	0
Ethnicity	European	0	15	3	164	193	6	5	0
	Maori	0	3	5	37	36	0	0	0
	Pacific Peoples	0	0	0	5	5	0	0	0
	Asian	0	0	0	3	3	0	0	0
	Other	0	3	0	12	18	23	0	0
	Unknown	0	0	3	8	15	0	0	0
Overall[5]		**0**	**16**	**9**	**228**	**270**	**29**	**6**	**0**

[1] J68.0 – J68.3
[2] L23.0 – L23.5, L23.7, L23.8, L24.0–L24.5, L24.7, L24.8, L25.0–L25.3, L25.5, L23.8, L27.0, L27.1
[3] T36.0 – T50.9
[4] T51.0 – T65.9
[5] Where counts are equal to 3, this could reflect a number between 1 and 3 and thus the overall total may not be the actual total of cases.

Table 24: CSO Chemical Injury Data by DHB, 2005 and 2006

DHB	2005					2006				
	"A"	"I"	"U"	Total	Rate[1]	"A"	"I"	"U"	Total	Rate[1]
Northland	1	4	3	8	5.4	1	7	0	8	5.4
Waitemata	1	19	2	22	4.6	4	15	0	19	3.9
Auckland	5	4	12	21	5.2	4	9	6	19	4.7
Counties Manukau	2	15	5	22	5.1	1	12	3	16	3.7
Waikato	6	15	0	21	6.2	3	10	2	15	4.4
Lakes	2	2	1	5	5.1	0	2	0	2	2.0
Bay of Plenty	1	14	2	17	8.7	0	6	0	6	3.1
Tairawhiti	0	0	1	1	2.3	0	1	0	1	2.3
Taranaki	0	8	0	8	7.7	1	3	2	6	5.8
Hawke's Bay	0	5	2	7	4.7	0	3	0	3	2.0
Whanganui	3	4	1	8	12.9	0	1	0	1	1.6
MidCentral	3	15	0	18	11.3	3	7	2	12	7.6
Hutt	1	1	1	3	2.2	0	2	1	3	2.2
Capital and Coast	2	3	6	11	4.1	1	7	2	10	3.8
Wairarapa	0	2	0	2	5.2	0	0	1	1	2.6
Nelson Marlborough	1	6	2	9	6.9	0	3	0	3	2.3
West Coast	1	0	0	1	3.2	0	2	1	3	9.6
Canterbury	6	13	4	23	4.9	11	12	6	29	6.2
South Canterbury	0	3	0	3	5.6	0	1	1	2	3.7
Otago	1	5	1	7	3.9	3	5	3	11	6.1
Southland	2	8	0	10	9.4	0	5	1	6	5.6
Unknown/missing	0	0	0	0		0	0	1	1	
National	**38**	**146**	**43**	**227**	**5.6**	**32**	**113**	**32**	**177**	**4.4**

[1] Rate calculated using 2006 Census data and expressed per 100 000 population. Caution advised when interpreting rates based on counts less than ten.
"A" = Accidental or Unintentional, "I" = Intentional and "U" = Unknown Intent

Table 25: CSO Chemical Injury Demographic Data, 2005 and 2006

Demographics		2005					2006				
		"A"	"I"	"U"	Total	Rate[1]	"A"	"I"	"U"	Total	Rate[1]
Age Group	0-4	0	0	0	0	0.0	0	0	0	0	0.0
	5-14	2	0	0	2	0.3	1	0	0	1	0.2
	15-24	4	15	2	21	3.7	5	12	3	20	3.5
	25-44	22	68	15	105	9.3	16	44	14	74	6.5
	45-64	7	48	24	79	8.2	9	42	13	64	6.7
	65+	3	15	2	20	4.0	1	14	2	17	3.4
	Unknown	0	0	0	0		0	1	0	1	
Sex	Female	10	40	9	59	2.9	7	37	9	53	2.6
	Male	28	106	34	168	8.5	25	76	23	124	6.3
Ethnicity	European	29	113	31	173	6.4	27	96	26	149	5.5
	Maori	6	16	9	31	5.5	4	8	4	16	2.8
	Pacific	0	0	0	0	0.0	1	1	0	2	0.9
	Asian	2	6	2	10	2.9	0	4	0	4	1.2
	Other	0	1	0	1		0	0	0	0	
	Unknown	1	10	1	12		0	4	2	6	
National		**38**	**146**	**43**	**227**	**5.6**	**32**	**113**	**32**	**177**	**4.4**

[1] Rate calculated using 2006 Census data and expressed per 100 000 population. Caution advised when interpreting rates based on counts less than ten.
"A" = Accidental or Unintentional, "I" = Intentional and "U" = Unknown Intent

Table 26: CSO Chemical Injury Data by Substance Class[1], 2005 and 2006

Substance Class	2005		2006	
	No.	%[2]	No.	%[2]
Household/Domestic Chemicals[3]	104	46.4	85	50.3
Therapeutics	66	29.5	51	30.2
Chemical/Drugs of Abuse	52	23.2	29	17.2
Agrichemicals	1	0.4	4	2.4
Industrial Chemicals	1	0.4	0	0.0
Unknown	3		8	
Total	**227**		**177**	

[1] Substance class assigned using primary substance identified as involved in death.
[2] Proportion (%) of total substances (for respective year) where substance class was known.
[3] Includes carbon monoxide (vehicle exhaust).

Table 27: CSO Chemical Injury Data by Primary Substance[1], 2005 and 2006

Year	Unintentional		Intentional		Unknown		Total	
	Primary Substance (Top 5)	No.	Primary Substance (Top 4)	No.	Primary Substance (Top 5)	No.	Primary Substance (Top 5)	No.
2005	Methadone	9	Carbon Monoxide	102	Ethanol	12	Carbon Monoxide	103
	Hydrocarbon	6	Amitriptyline	6	Ethanol (chronic)	7	Ethanol	16
	Morphine or Heroin	5	Nortriptyline	4	Morphine or Heroin	3	Methadone	14
	Ethanol	4	Morphine or Heroin	3	Methadone	3	Morphine or Heroin	11
	Methamphetamine	3			Codeine	3	Hydrocarbon	10
	Primary Substance (Top 5)	No.	Primary Substance (Top 4)	No.	Primary Substance (Top 4)	No.	Primary Substance (Top 5)	No.
2006	Morphine or Heroin	7	Carbon Monoxide	73	Ethanol (chronic)	6	Carbon Monoxide	77
	Methadone	7	Amitriptyline	6	Ethanol	4	Morphine or Heroin	11
	Ethanol	4	Hydrocarbon	6	Morphine or Heroin	3	Methadone	11
	Carbon Monoxide	2	Venlafaxine	3	Methadone	3	Hydrocarbon	9
	Hydrocarbon	2					Ethanol	8

[1] Primary substance identified as involved in death where substance was known

Table 28: Demographics for CSO HSNO Substances, 2005 and 2006 Combined
Note: Where count of substance is not greater than one, details are not included in the table to protect privacy. Relevant substances include: diquat, glyphosate, paraquat, methylated spirits and caustic soda.

Characteristics	HSNO Substances		
	Carbon Monoxide	Hydrocarbon[1]	Cyanide
Number (primary substance[2])	180	19	2
DHB			
Northland	10	0	0
Waitemata	22	4	0
Auckland	4	3	0
Counties Manukau	21	4	0
Waikato	21	1	0
Lakes	3	0	0
Bay of Plenty	13	0	0
Tairawhiti	1	0	0
Taranaki	7	0	1
Hawke's Bay	5	0	0
Whanganui	3	0	0
MidCentral	22	1	0
Hutt	1	0	0
Capital and Coast	5	0	0
Wairarapa	2	0	0
Nelson Marlborough	6	2	0
West Coast	1	2	0
Canterbury	19	0	0
South Canterbury	3	0	0
Otago	3	1	0
Southland	8	1	0
Unknown/missing	0	0	1
Intent			
Intentional	175	8	1
Unintentional	2	8	0
Indeterminate/Unknown	3	3	1
Age			
0-4	0	0	0
5-14	0	3	0
15-24	19	6	0
25-44	78	5	1
45-64	60	3	1
65+	22	2	0
Unknown	1	0	0
Sex			
Female	39	3	1
Male	141	16	1

[1] Hydrocarbon includes petrol, turpentine, LPG, butane etc.
[2] Primary substance identified as involved in death

APPENDIX 2

Chemical category working definitions with examples:

- **Therapeutics**: Prescription or non-prescription drugs are included in this category even if they are used inappropriately (i.e. deliberately with intent to injure, or with intent to abuse but not injure).

- **Agrichemicals**: Includes pesticides and licensed veterinary medicines.

- **Industrial chemicals**: For instance, solvents and caustic chemicals used in an industrial or occupational setting. The same chemicals may also be found in the home (for example, isopropyl alcohol), and be covered under household/domestic.

- **Household/domestic chemicals**: cleansers, detergents, methylated spirits (accidents only), carbon monoxide, etc...

- **Chemicals/drugs of abuse**: Includes chemicals of addiction. Methylated spirits, ethanol, methadone, heroin, cocaine, methamphetamine, fantasy, ecstacy, etc…

- **Herbal remedies/dietary supplements**: vitamins, natural product remedies, etc…

- **Plants**: garden plants

- **Bites/Stings:** spider bites, bee stings

- **Other/Unknown**